Exhibit 7

IN THE UNITED STATES DISTRICT COURT
DISTRICT OF NEW JERSEY
CAMDEN DIVISION

IN RE: VALSARTAN LOSARTAN, AND IRBESARTAN PRODUCTS LIABILITY LITIGATION	)	
	)	No. 2875
	)	HON. ROBERT B. KUGLER
This Document Relates to All Actions	)	

CONFIDENTIAL INFORMATION
SUBJECT TO PROTECTIVE ORDER
REMOTE
VIDEO-RECORDED
EXPERT WITNESS TESTIMONY OF
DAVID C. CHAN, JR., M.D.

Thursday, March 3, 2022, 7:49 a.m.

- - - -

REPORTED BY: ELAINA BULDA-JONES, CSR 11720

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Also present:

Joseph Mourgos, videographer

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THE VIDEOGRAPHER: We are now on the record. My name is Joseph Mourgos. I am a videographer for Golkow Litigation Services.

Today's date is March 3rd, 2022, and the time on the video monitor is 7:49 a.m. Pacific time.

This remote video deposition is being held in the matter of Valsartan, Losartan and Irbesartan Products Liability Litigation MDL Number 2875 for the United States District Court, District of New Jersey.

The deponent is Dr. David Chan.

All parties to this deposition are appearing remotely and have agreed to the witness being sworn in remotely.

Due to the nature of remote reporting, please pause briefly before speaking to ensure all parties are heard completely.

Counsel has been noted on the stenographic record.

The court reporter is Elaina Bulda-Jones and she will now administer the oath.

DAVID C. CHAN, JR., M.D.,

called as a witness by the Plaintiffs herein, being first duly sworn by the Certified Shorthand Reporter was thereupon examined and testified as is hereinafter set forth.

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EXAMINATION

BY MR. MIGLIACCIO:

Q. Good morning, Dr. Chan. My name is Nick Migliaccio. I am one of the lawyers for the plaintiffs in this case. Thanks for taking time with us this morning.

Could you state your full name for the record, please.

A. Sure. Good morning.

My name is David Chimin Chan, Junior.

Q. Okay. And have you ever been deposed before?

A. Yes, I have.

Q. Okay. I'll go through some ground rules even though you've been through it, but I'll -- I'll just give them anyway.

You know, I'm going to ask you a series of questions and I'm going to ask that you give me your best answers to them and if you don't understand a question, I'm going to ask that you tell me and I can rephrase it; is that fair?

A. Yes, thank you.

Q. Great.

Are you taking any medication today that would impede your ability to recall events or testify truthfully?

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A. No.

Q. Okay. This is not a marathon session. You know, we're not going to try to go through the whole thing in one -- one shot. So if -- and I know you're a doctor, so obviously, if you have an urgent patient call, just tell us, you know, because we want you to take care of your patients, you know. We understand that.

So, you know, and we will take breaks, you know, and if you need a break just ask for one and as long as there's not a, you know, question pending, that -- that's totally fine, fair?

A. Yes, thank you.

Q. In the other depositions that you had, when were those depositions?

A. I believe they were within the last year or two.

Q. Okay. Got it.

And I -- you know, we're taking this deposition remotely, obviously.

Do you have anybody else in the room with you there?

A. No.

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Q. Do you have any documents with you?
A. No.
Q. Okay. Great.
Did you see the deposition notice that we sent over in this case?
A. Are you referring to the most recent one about a week -- within a week of this?
Q. That's right.
A. I believe I was forwarded either the notice or some snippet of the notice.
Q. Got it.
I'm going to try to share it with you, so forgive me if I fumble with this technology because I might. But I'm going to do my best to put this into your folder because we're going to have exhibits, obviously. And I'm going to -- I watched the video, and we'll see if it works. I should have, perhaps, practiced this.
Okay. I believe I put your deposition notice in the marked exhibits folder.
A. Okay. Yep, I'm seeing it now.
Q. Okay. Great.
MR. MIGLIACCIO: I want to mark that as Exhibit 1. I'm not quite sure how to do that but we can address that.

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(Whereupon, Chan Exhibit 1 was marked for identification.)
BY MR. MIGLIACCIO:
Q. Is this the document that you saw?
A. I don't think I saw the entire document. I think I saw some of the questions and document requests.
Q. Okay. I'm going to look.
So Exhibit A, which is on page 3, contains document requests, right?
A. Correct.
Q. Okay. Did you search for those documents that were requested?
A. To the extent that I had the relevant documents.
Q. Was there anything that you were not able to find?
A. No.
Q. Okay. Were there any documents that you reviewed in forming your opinion that were not included in the documents that you provided to your lawyers and, you know, to us?
A. Are you referring to the materials considered list that informed my opinion in the report?

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Q. I'm referring to that, and I'm referring to what we've asked for here in Exhibit A.
A. Okay.
Q. So in other words, if there's anything that we've asked for here that maybe wasn't included on the materials considered list or otherwise not provided to -- to us.
A. That would inform my opinions in the report?
Q. Correct.
A. Okay. So there was -- there's no other document, specific document informing my opinions in the report other than my expertise as a physician and as a health economist.
Q. Were there any documents or materials that you reviewed in preparation for this deposition that were not included in the materials that were produced to us?
A. No.
Q. So you -- fair to say, then, you haven't looked at anything other than the materials that you've provided?
A. The materials on the materials considered list; is that right? Yes.
Q. And the materials that have been provided

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to us now?
A. Correct.
Q. Okay. Were there any documents that you wanted to review but you couldn't get or otherwise were not provided?
A. No.
Q. Okay. What did you do to prepare for your deposition?
A. What did I do to prepare for this deposition in particular or what did I do during the course of the case to form my opinions?
Q. Just to prepare for this deposition in particular.
A. Okay. I reviewed the report. I reviewed some of the other reports from Conti, Song, and Kaplan.
I had phone calls with the lawyers, and I had phone calls with Analysis Group.
Q. Who is Analysis Group?
A. Analysis Group is an economic consulting firm.
Q. And where -- where are they located?
A. I believe they have a number of different offices. Most of the people that I worked with are in the Boston office, but there are also people --

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there's one person that I worked with who's in the Menlo Park office.
Q. And when you said you had phone calls with the Analysis Group who did you speak with at the Analysis Group?
A. The people that I was in most contact with include several people. So they include Jessica Lu, Michaela Johnson, Brian Ellman, Richard Mortimer, and Molly Frean.
Those were the people that I had the most contact with.
Q. So can you tell me who those people are and we can ask -- I'll ask you about them later when we go through your invoice.
But can you just briefly tell me who those -- those individuals are?
A. Sure.
MR. STOY: Object to the form.
Go ahead.
THE WITNESS: Do you -- could you be a little bit more specific about what do you mean by who they are?
BY MR. MIGLIACCIO:
Q. Well, I know they work for the Analysis Group. You know, what is -- you know, what is their

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position and how -- what did they do in terms of working with you?
MR. STOY: Object to the form.
THE WITNESS: So I can tell you that two of them are partners. Richard Mortimer and Brian Ellman are partners.
Other members are managers or people that I think are at the level below partners but have quite a bit of experience and, you know, have advanced degrees in economics or management. Those include Michaela Johnson and Jessica Lu.
Molly Frean is another analyst who has a Ph.D. in health policy or health economics.
And I believe those are the people that I mentioned that I interacted mostly with.
BY MR. MIGLIACCIO:
Q. Any physicians in that group?
A. No.
Q. Okay. Are you the only physician, then, I guess, who worked on this report?
A. Of the people that I mentioned, I'm the only physician. There could be other people at Analysis Group that performed very -- that performed a role that -- like a role to check the quality control, the document, or look at the code, for

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example, that I don't know exactly who they are.
And I can't rule out that there might be some physicians in that group.
Q. Who -- who worked on your report?
A. Who, for example, might have kind of checked for typos or who might have been in the -- they have an extensive quality control process, I believe, at Analysis Group, to, you know, check -- make sure that all the references that I've looked at are in there, make sure that the document is free of typos, make sure the code is free of errors, make sure that stuff is kind of in the correct folders in the -- in the code and in the input data and the exhibits.
So there -- I would expect that there is a fairly big team involved in that, just like there's a team involved in my own research that is involved in quality control.
Q. Got it.
What did you, you know, read or review to prepare for -- for today's deposition?
A. I believe I mentioned I read my report. I read the reports of some of the other experts on the plaintiffs' side, including Dr. Song, Dr. Kaplan, and Dr. Conti.

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I reviewed some of the primary sources that I relied upon in forming my opinion. I believe those are the main documents that I read in preparation for this deposition.
Q. And I think you told me you spoke with lawyers, too?
A. Correct.
Q. Who -- who did you speak with?
A. I don't remember all of the names of the lawyers. But I spoke to Frank Stoy, who's on this call. I spoke to Bob Kum. K-U-M is his last name. Glenn Kerner. Kate Wittlake.
I believe those are -- those are the names that I remember speaking to.
Q. And how many sessions did you have speaking to -- to the lawyers?
A. In preparation for the deposition?
Q. Yes.
A. I don't remember exactly the number. I want to say something like four sessions, three to four sessions.
Q. How long did those sessions each take?
A. I think that they could have been as short as two hours or three hours, and they could have also been longer, more like seven hours. Around

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that ballpark.
Q. You may have had one or more, like, seven-hour sessions?
A. Maybe one, correct, one or more.
Q. All right.
A. Seven-hour sessions.
Q. Got it. Got it.
What was discussed during those sessions?
MR. STOY: I'm going to object and instruct you not to answer.
That question, Dr. Chan, is -- that's obviously covered by the privilege and work product doctrine.
THE WITNESS: Okay.
MR. MIGLIACCIO: Let me rephrase that.
Q. Which documents were discussed at those -- at those sessions?
MR. STOY: And I'll just -- I'll just give a limiting instruction, Dr. Chan.
If you know, you can answer the question about particular documents, but I'd ask you not to -- I'd instruct you not to disclose anything in particular that was discussed about any documents.
THE WITNESS: Okay.
MR. STOY: With that instruction, you can

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answer.
THE WITNESS: I would say that we discussed all of the documents that I mentioned in general in -- that I used in preparation for this deposition, including my report, the reports of some of the plaintiffs -- the plaintiff experts, including Dr. Song, Dr. Conti, and Dr. Kaplan.
We also discussed some of the primary source material, but I can't remember exactly which ones that we discussed.
BY MR. MIGLIACCIO:
Q. When you refer to "primary source material," what do you mean?
A. I mean the materials -- some of the materials that I considered in forming my opinions that are in my materials considered list.
Q. Got it.
For the -- did you have preparation sessions outside of speaking with the lawyers; in other words, did you talk to people, those other individuals at the Analysis Group to prepare?
A. I had calls with the Analysis Group to review my report, to review the analyses and the data and the code underlying my report.
I also had -- yeah, I also had sessions to

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review the state of the data, like I believe I just mentioned that, the state of the data underlying the analyses in my report.
So yes, I did have calls with Analysis Group for that purpose.
Q. And those -- did you have any calls in preparation for this deposition with the Analysis Group?
A. Yes, that -- that was just what I mentioned.
Q. Okay. Okay.
That -- so that -- those calls were not -- okay. I assume you also had calls with them when you were finalizing the report?
A. Correct.
Q. But you were just telling me about calls in preparation for the deposition?
A. Right.
Q. What -- so those calls were -- that -- that you had with them, were after the report has been finalized, right? Because I think the report's dated January 12th.
When did you have those calls with the Analysis Group that you just referenced?
A. The calls -- those calls were in

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preparation for the deposition. And they were in the last two weeks.
Q. Two weeks.
Were any of the lawyers on those calls?
A. No.
Q. Okay. How many of those calls did you have with the Analysis Group?
A. Maybe two.
Q. Two. And how long were those sessions?
A. I think they were less than four hours each, maybe three hours each.
Q. Got it.
Did you discuss -- and you said you were discussing the state of the data, if I -- if you could give me a little more background on that, maybe -- I didn't mean to misstate what you said, so do I have that right?
A. Yes.
MR. STOY: Hang on.
Before you answer, Dr. Chan, I'm going to instruct you not to go into any more detail than you've already provided regarding those discussions with Analysis Group.
We'd object on the same basis as before with respect to the work product.

Nick, you know, I allowed him to give you sort of a high level overview of, you know, the discussion that might have occurred with Analysis Group, but we're not going to go into any more detail than that.

MR. MIGLIACCIO: Well, Frank, I mean, I think it's relevant to figure out if -- you know, if the date has changed. I mean, the report was submitted on the 12th of January, and that's what I'm trying to drive at here.

MR. STOY: Well, you -- you can ask Dr. Chan if the data has changed. I think he can answer that question. But with respect to particulars about discussions with Analysis Group, my instruction's going to be not to answer those questions.

MR. MIGLIACCIO: All right. I'll limit my question for the time being to the -- to the data.

Q. Did the data change at the time -- did any data change from the time the report was finalized until now?

A. No, none of the data had changed. None of the analyses had changed. It was purely to review what I had already reviewed before.

Q. Okay. So there wasn't any new work done,

then, in other words? That -- that's what I'm trying to -- to find out. No subsequent analysis has -- was completed?

A. No, that's correct.

Q. Okay. Did you -- did you obtain -- how did you get information about this case at the -- at the beginning when you were -- when you started working on it?

A. Is your question about before I was retained or after I was retained?

Q. Well, how about -- why don't -- I'll ask it this way.

Why don't you tell me when you were retained and then we can take it from there.

A. I believe I was retained around December of last year. It was a pretty short timeline, but -- as I recall, but I don't remember the exact -- when it exactly -- when I was exactly retained, but I think it was around December of last year.

Q. And who -- who contacted you?

A. My initial contact was Brian Ellman at the Analysis Group.

Q. Do you have a working relationship with the Analysis Group or did you have a prior working

relationship with them?

A. I have worked with the Analysis Group on other cases.

Q. And how long have you worked with them on other cases?

A. I believe my first contact with the Analysis Group was before the pandemic so I think about two to three years.

Q. Okay. And I'll -- I'll get into those other cases.

But I'll just ask you now, were those other cases cases that you provided reports and/or deposition testimony in?

MR. STOY: And before you answer, Dr. Chan, I just want to give you an instruction.

You can answer counsel's questions for now with respect to cases where you have been identified as a testifying expert.

But for any litigations or other matters where you've been retained as a nontestifying consultant and haven't been publicly disclosed, I would instruct you to not reveal the nature of those disclosures, the parties that retained you, any of that information.

With that instruction, you can answer the

question.

MR. MIGLIACCIO: I'm -- I'm not asking for any of that information.

Q. I'm just asking for where you have prepared a report, you know, that you've been designated as an expert or if you testified at deposition.

MR. STOY: Thank you.

THE WITNESS: Thank you.

I don't know exactly what is in the public record and what is not. I can tell you that I have been deposed in some of these cases.

BY MR. MIGLIACCIO:

Q. Where you have been working with the Analysis Group?

A. Correct.

Q. Got it. Okay.

So you said December, you think it was around December of last year that you were hired?

A. Correct.

Q. Got it.

And you were contacted by -- I forget the person's name -- can you -- somebody at the Analysis Group, right?

A. Right. My initial contact was Brian

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Ellman at the Analysis Group.
Q. Ellman. Got it.
How was that contact initiated?
A. I believe the first contact was by e-mail.
Q. Okay. And did you -- have you previously worked with Mr. Ellman before?
A. I had been in conversations with him on another case that I was not retained on. The cases that I was retained on previously was with another individual at Analysis Group as the main contact, but I did know Brian from previous conversations.
Q. Okay. And how did you decide that you would agree to -- to offer your opinion in this case?
MR. STOY: Object to the form.
Go ahead.
THE WITNESS: Can you restate that question?
BY MR. MIGLIACCIO:
Q. Right.
How did you come to determine that you would offer an opinion in this case?
A. Is the question how did I come determine -- come to determine that I would agree to be involved in this case?

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Q. That -- that's fair. Yeah.
A. Okay. The initial conversation was with Brian who told me some basic information about the case. He may have provided me the complaint in the case. Then I had a discussion with the lawyers involved in the case.
I believe I spent some time thinking about the questions involved in the case and what types of questions I would want to answer if I were involved in the case.
Then I believe I might have had a subsequent discussion with the lawyers and then came to the conclusion that this was a case that I would agree to be involved in.
Q. What -- what were you initially told about the facts? What facts were you provided initially?
A. I believe I was mostly just provided legal documents involved in the case. The complaint involved in the case.
Q. And did there come a point where you asked for other materials?
A. I've only received legal documents from the lawyers. Analysis Group is -- is essentially assisting me in my research so I kind of -- I directed them to find materials to answer questions

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that I had related to the case.
So I received materials that I asked for from Analysis Group. And from the lawyers, I believe I only received legal documents related to the case.
Q. Were you asked -- I mean, I have a copy of your report here and we'll put it up and it's -- you know, it's lengthy, right. It's 88 pages or so.
A. Yes.
Q. Were you asked to render all of the opinions that are within this report initially or did the scope of your work evolve over -- over time?
MR. STOY: Object to the form.
You can answer.
THE WITNESS: Would you like to restate your question?
BY MR. MIGLIACCIO:
Q. Yeah.
Was -- were you asked to render all of the opinions that are here in -- in this report that -- that you signed in January initially from -- from the outset or were -- or were you asked to do a smaller subset of them at the outset that later expanded?
MR. STOY: Object to the form.

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You can answer.
THE WITNESS: My assignment, are you asking about the assignment of my case, my assignment, whether my assignment was fixed from the very beginning or whether my assignment expanded over time?
BY MR. MIGLIACCIO:
Q. You -- you can answer that question. But I may have some further questions for you.
A. My initial assignment was on the claims related to medical monitoring and that involved the reports of Dr. Song and Dr. Kaplan.
I believe at a later point in the case, as I was writing my report, given my expertise as an economist, I was asked to weigh in on the claim of worthlessness by Dr. Conti.
Q. Got it.
So that was not part of your initial assignment when you -- when you first were retained?
A. When I was first retained, I believe a lot was in flux in the case. I think there was nothing set in stone, but my initial instructions were to address the claim of medical monitoring.
Q. What documents -- you said you received legal documents at the outset from the lawyers.

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A. Right.
Q. Do you recall what those documents were that you initially received?
A. I received the complaint. There was a protective order I -- I believe I received. And I received reports from some of the plaintiff experts. The ones that I can remember are the reports by Dr. Song, Dr. Kaplan, and Dr. Conti.
Q. Okay. When you're talking about the complaint, are you referring to the third amended medical monitoring complaint?
A. I don't remember exactly what the name of the complaint was. I only received one complaint.
Q. Got it.
And that -- you've produced that to us, I believe; is that -- is that right?
A. I believe I have.
Q. Okay. And what documents did you -- I think -- what documents did you ask Analysis Group to gather for you after you received the legal documents?
MR. STOY: Object to the form.
Go ahead.
THE WITNESS: I can't remember exactly which documents. I can tell you in general how my

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research process works if that would be helpful.
BY MR. MIGLIACCIO:
Q. Yeah, let me -- I'll ask you another question, then. I'll -- I do -- I'll get into that.
I think you said, "I directed them to find materials to answer questions that I had related to the case."
What initial questions did you have related to the case that you sought answers -- sought -- sought documents for?
A. I can't remember all of the initial questions. I would say that my questions could be organized in a way that very much reflects the organization of my report.
So some of the questions were organized into what are the various risks of cancer, what are the -- what is the state of guidelines regarding screening for cancer, what are the various technologies that we use for screening cancer, what are the various risks that are involved in screening for cancer, what are the characteristics of various screening tests, like the sensitivity and specificity of those screening tests for cancer, what are -- what are -- I guess this falls under the guidelines for screening for cancer, but what are

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the considerations for various patients who might be screened for cancer or who might already be screened for cancer for other reasons.
So those were some of the questions that I had initially. I can't remember fully all of the questions. But those questions prompted requests for documents in a way that is consistent with the way that I do research.
Q. So you had those questions and you prompted requests for -- they prompted requests for documents to Analysis Group to gather information on those questions and provide them to you?
A. Correct.
Q. Got it.
And at Analysis Group, I think you told me there were -- there may be some physicians, but did you know of any physicians who were gathering that information for you when you asked for it?
MR. STOY: Object to the form.
THE WITNESS: Would you like to restate that question?
BY MR. MIGLIACCIO:
Q. Yeah.
I think you testified that there may be some physicians at Analysis Group originally, and I

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want to know who you directed these questions to and who would be gathering the information to provide to you and if you knew if those people were physicians?
MR. STOY: Objection to form.
THE WITNESS: As I mentioned, I primarily dealt with the people that I named that I was interacting with at Analysis Group. There is likely a support team to help those people, but those people are very knowledgeable in healthcare, very knowledgeable in health policy and would interface, I think, well if there were a physician on the health policy question like a screening guideline.
So I don't know if they were interfacing with any physicians at Analysis Group. They could have been.
BY MR. MIGLIACCIO:
Q. Got it.
What -- what arrangements did you come to regarding your fee and -- and your fees in the -- for the report?
MR. STOY: Object to the form.
THE WITNESS: Can you restate that question?
BY MR. MIGLIACCIO:
Q. I mean, do you have an arrangement with

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respect to fees for -- for the report?
A. Yes.
Q. And what is that arrangement?
A. The arrangement is that I am paid for my own time at a rate of $850 an hour, as stated in my report. That is the arrangement that I have with the lawyers in this case.
And I also am paid what's called attribution, which is a percentage of the fees that Analysis Group charges for the work in support of my work.
Q. Got it.
What is that percentage that you get for attribution?
A. Is that in my report? I'm not sure --
THE WITNESS: Is that privileged information or is that...
MR. MIGLIACCIO: I don't think that's privileged. I mean, I can talk with Frank about it, but I think that directly goes to -- to what -- you know, what his compensation is.
MR. STOY: Yeah, you --
MR. MIGLIACCIO: Frank, I --
MR. STOY: You can answer that question, Dr. Chan, if you know.

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THE WITNESS: Okay.
20 percent.
BY MR. MIGLIACCIO:
Q. 20 percent.
So that -- so you receive 20 percent of the fees that attribution -- that Analysis Group has billed and recovered for this report, too?
A. Correct.
Q. Got it.
Is that reflected in a written agreement anywhere?
A. That's reflected in an agreement that I have with the Analysis Group.
Q. Do we have that agreement? I -- I don't recall seeing it.
A. I don't know.
MR. MIGLIACCIO: Frank, do you know?
MR. STOY: I don't believe that is something that we've produced.
MR. MIGLIACCIO: Okay. I'm going to just mark for the record that I'm -- you know, we do want to see it. Prefer to see it today, if possible, so we could -- you know, I think it's directly called for by the -- by the Rules and by our request.
MR. STOY: All right. Well, I'm not sure

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about that, but that's something that we can talk about off the record.
MR. MIGLIACCIO: Sure.
MR. STOY: Your request is noted.
BY MR. MIGLIACCIO:
Q. Do your hourly rate -- does your hourly rate change for deposition testimony, like do you have a day rate for this or is it just -- just an hourly rate?
A. It's just the hourly rate.
Q. Same rate.
Trial testimony, different rate, same rate?
A. I believe it's the same rate.
Q. And file review, I mean, if -- do you have -- is that a separate rate or is that the same, too?
A. Same rate for everything.
Q. Okay. So like fair to say, then, that you only have this $850-an-hour rate for whatever you do?
A. Yes.
Q. It's that simple. Okay. Got it.
Have you billed anything -- let me -- strike that.

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What percentage of your income, you know, would you say comes from -- from your expert work?
MR. STOY: And you can answer that question but you don't have to answer -- you don't have to elaborate about, you know, what your income level is.
MR. MIGLIACCIO: I'm not asking for that.
Q. I'm -- yeah, I'm not asking you for that. I understand.
A. Right. Right.
I'm not sure I can kind of give you a precise figure here. I can maybe tell you the percent of my time that I spent, but you're asking the percent of my income.
Q. Right. Right.
You could tell -- tell me your time and -- I mean, you can think about the income question. We can come back to it later. I understand it's -- you might have to do some mental --
A. Right. Yeah.
Q. -- mental arithmetic.
A. I'm afraid that if I answer the income question, you're going to back out my income.
Q. I don't intend to back out your income. I just want to get -- I'm not trying to -- and this --

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I mean, I'm not trying to get at sensitive personal information here. That's not my goal.

I just want to see, you know, what you do in terms of, you know, is this a big part of -- of your life or is it a small part? That's what I'm trying to drive at.

A. Uh-huh. In terms of the hours that I spend on my work, it's -- I would say it's a relatively small part of my life.

If you're -- if you're asking whether this is a small part of my life or a big part of my life, I would say it's -- you know, I spend most of my hours not working on litigation consulting.

Q. If I could -- could you ballpark a percentage of the percentage of your time spent on litigation consulting?

A. I'm sorry, say that again.

Q. Could -- could you ballpark a percentage of the time you spend working on litigation consulting?

A. Ballpark would be less than 20 percent.

Q. Got it. Got it.

I want to ask you some questions about your -- your background.

I know, you know, you're a physician and

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an economist, you know, and you have multiple degrees. I -- you know, can you walk me through your educational history and kind of what -- just for starters.

A. Sure.

Would you like to refer to the CV or would you like me to just --

Q. We can pull -- you can go -- you can just go and -- because I can try to get the CV up. I'm sure I'll be able to, you know, once I figure out this technology. I'm not trying to hide it from you.

A. Sure.

My first degree that I post -- after undergrad that I enrolled in was a medical degree at UCLA. In the middle of that medical degree, I became quite interested in health policy and health economics and I took two years off where I was a Marshall Scholar in England and had two master's degrees in health policy and health economics.

After coming back from that, I completed medical school and started my residency program at Brigham and Women's Hospital in Boston.

And I kind of knew that I wanted to do a Ph.D. when I came back from England and I enrolled

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in the Ph.D. in economics at MIT after finishing my residency in internal medicine. I finished my Ph.D. in economics in 2013.

And then I had my first job as a faculty here at Stanford.

Q. Got it.

So you started -- the -- the -- it sounds like you -- you took time -- did you take time off from medical school? Do I have that straight or --

A. It was a leave of absence from medical school. I would say about a third of my class took some form of leave of absence to do some type of research work or some type of fellowship in the middle of med school and mine was to do economics and health policy.

Q. Got it.

I didn't mean that in a pejorative way to say "time off." I understand a leave of absence.

So -- and that's when you -- you became a Marshall Scholar and went to -- to get those degrees?

A. Correct.

Q. Got it.

And I think I have your CV up here now. We can --

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MR. MIGLIACCIO: I'd like to mark the report and the attachments as Exhibit 2.

(Whereupon, Chan Exhibit 2 was marked for identification.)

BY MR. MIGLIACCIO:

Q. And I think it's up there now.

A. Okay. Yeah, I see it.

Q. Yeah. I see -- I think your CV is Appendix A.

A. Right.

Q. Yeah.

A. Great.

Q. Yeah. Great.

You -- I see. So that -- and that -- I see. So you -- you start -- did you start medical school directly after college?

A. Correct.

Q. Okay. And then you took the leave of absence to become a Marshall Scholar to go and get these other degrees and then finish medical school?

A. Correct.

Q. Got it.

And then later, obtained your Ph.D. from MIT?

A. Correct.

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Q. Got it.
What did you -- in terms of your career as a physician, could you walk me through that?
A. Sure.
My residency was in internal medicine. This was at Brigham and Women's Hospital where I spent quite a bit of time in primary care. They have a primary care track at -- in this residency program. So I spent quite a bit in outpatient medicine. But the average -- still the average residency program is predominantly inpatient medicine, but I spent a little bit more time than the average resident in primary care.
I finished that residency in 2008 and that's when I started the Ph.D. program in economics.
During the first year of the Ph.D. program, I did not have a steady clinical job. I -- I worked as a physician as a -- what's called a -- well, it's a moonlighting position where you would kind of put in -- I probably worked maybe 20 nights that year or 30 nights that year where you kind of worked at a hospital, at the Brigham in particular, and I admitted patients at that hospital.
And then in my second year of the Ph.D.

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program, I had my first clinical job as an attending physician at Beth Israel Deaconess Medical Center, which you see there.
Actually, strike that.
That -- that was actually in the -- near the beginning of the third year of my Ph.D. so I think I continued to do moonlight -- you can see my appointments at hospitals and affiliated institutions on my CV.
Q. Where -- can you just tell me that page that is?
A. This is A -- A-2.
Q. A-2. Okay.
A. Yeah, so you could see that...
Q. Yeah.
A. Right.
So I had two positions. I had two positions before I was a staff physician at Beth Israel Deaconess Medical Center. I was a staff physician at Brigham and Women's Hospital, but my job there was mainly a moonlighting position.
And I also later that year, in 2008, was a staff physician at McLean Hospital, which is a hospital in the Massachusetts General Physicians Organization. Both of those jobs were moonlighting

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jobs.
And I had my first kind of staff job where I was educating residents at Beth Israel Deaconess Medical Center. This was in 2010, starting in November of 2010. I had that job all the way until I finished my Ph.D. in June of 2013.
And then after that I came here to Palo Alto for an academic appointment at Stanford where I was a staff physician in internal medicine at the Palo Alto Veterans Affairs Health Care System.
Q. Got it.
So that first position at Brigham -- Brigham and Women's, you said that that had a significant part of outpatient work? Did I have that straight?
A. It had as much -- had more outpatient exposure than the average internal medicine residency program.
Q. And how do you characterize that or quantify that?
A. You can quantify it by the number of outpatient weeks that we have. So the typical internal medicine residency is structured in terms of rotations. You spend some rotations on various

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inpatient wards. You spend some rotations in the emergency department, and you spend some rotation doing outpatient care. And this residency program that I did had more weeks on inpatient care than the typical residency program.
Q. Got it.
And did that change at some point where you ended up spending more time like as typical doing inpatient?
A. Yes. I -- so after residency you have to choose what type of doctor you want to be. You could either go on to subspecialty fellowship and become, you know, say, a cardiologist or infectious disease doctor or you can remain within general medicine.
And within general medicine there are generally two types of jobs you could have. One is an outpatient job so you spend a hundred -- almost a hundred percent of your time as an outpatient doctor, increasingly so in the way medicine is organized right now.
Or you could be an inpatient doctor and spend close to a hundred percent of your time clinically as an inpatient doctor. And I chose the latter. So I'm what's called a hospitalist.

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Q. Hospitalist. Got it. Got it.
Did you have any -- as a hospitalist, do you have any specialties or is that -- hospitalist is like a generalist; is that fair?
A. Yes, a hospitalist by definition is a general internist who does not have a subspecialty.
Q. Okay.
A. So internal medicine is their specialty and they have no subspecialty.
Q. Do you have any areas of interest takeaway like a formal subspecialty? Do you have any areas of interest? Do hospitalists have that?
A. No. Hospitalists are quite general. We see a variety of patients in the inpatient setting.
At Palo Alto VA, I see patients who are general medicine patients. I see oncology patients. I see cardiology patients. A wide variety of patients who require hospitalization.
Q. Got it.
And you've been at Palo Alto VA from 2013 to the present?
A. Correct.
Q. How -- how much time do you -- or have you spent there on average, you know, in that period?
A. Right. I spend four weeks a year since I

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started there at -- in 2013. There are some hospitalists at Palo Alto VA that are full time and I think the full time -- I would have to check but oftentimes the full time -- a full-time hospitalist might see less than -- might be on the wards for less than half of the weeks of the year. So there's never a hospitalist that works all of the weeks of the year.
It's quite an intense job, I would say, and so it's not something like outpatient medicine where in outpatient medicine you can be seeing patients every week of the year. In hospital medicine, oftentimes a full-time person is half the weeks of the year.
And for an academic hospitalist like me that does research in addition to being a hospitalist you can have a range from four weeks a year to, I would say, as much as seven weeks a year, eight weeks a year, within that range.
Q. Got it.
Do you do those four weeks a year in a row or do you split them up?
A. I split them up.
Q. Okay. What is the period -- like the split period that you take? Is it a week or --

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A. Yeah, it's determined by how the hospitalists group decides to schedule rotations. Before I believe this last year, or the last two years, the rotations were two-week blocks. So I generally would work in two two-week blocks every year.
Starting about a year or two ago, the group decided to change it so that people would generally work in one-week blocks. And so now I work four one-week blocks.
Q. Got it. Got it.
And has that been the same like from 2013 to the present?
A. It has either been one-week blocks or two-week blocks since 2013.
Q. Yeah. Got it.
Four weeks total?
A. Four weeks total.
Q. Got it. Got it.
In your position in -- in Deaconess and in -- the other hospitals back east, what was your schedule there?
I mean, I -- that's kind of broad so I'll -- I don't -- let's just start with Beth Israel.

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A. Beth Israel Deaconess, I think my -- I don't know a hundred percent sure, but I believe my schedule was six weeks a year back there. And that is a reflection of just the different hospitals have different kind of norms in terms of what is the number of weeks that academic physicians will work. And so, as I mentioned, six weeks a year is kind of within the range.
Q. Got it.
What -- and what type of people would you -- what would -- how would you describe the patient population, you know, at Beth Israel Deaconess that you saw?
A. It was a fairly general patient population. I would see a number of different -- just the same as in Palo Alto VA, I would see patients with a wide variety of internal medicine complaints ranging from infectious disease to renal to, you know, pulmonology, cardiology, oncology, gastroenterology.
There -- there would be a number of different inpatient conditions, that is typical of a hospital medicine practice, that I would see there at Beth Israel Deaconess Medical Center.
Q. Okay. Would you say there's a difference

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at the -- at a VA hospital, like, is the patient population any different than at Beth Israel?

A. The patient population at the VA is predominantly male still. I would say it's 90 percent -- my patients are 90 percent male. At Beth Israel Deaconess, we did not have that. You know, the most obvious kind of structural difference is that the VA sees veterans and most veterans are male.

You will also have veterans that tend to be linked to certain wars. So there's veterans of the Vietnam era or veterans of kind of more recent, Iraq and Afghanistan era. So you'll have the age of the veterans kind of coming in waves that are related to wars as opposed to Beth Israel Deaconess we didn't have them.

Q. Got it.

So you see waves or bands of -- of age ranges?

A. Correct.

Q. Got it.

The moonlighting job, can you tell me a little bit more about what -- what that was? I mean, I -- I don't mean to say "job." The moonlighting schedule, is that better? Schedule?

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A. Sure.

Q. Yeah.

A. That was much more -- that was less -- that was a flexible -- the reason people have moonlighting jobs is to allow for flexibility. You don't necessarily commit to a schedule a whole year in advance, which is what I do now. Nowadays, I will say, what years I'm -- I will know which weeks I'm going to be working a whole year in advance.

For the moonlighting job, generally, the way that it works is that people sign up for shifts and this signing up of shifts can happen maybe like two weeks in advance or maybe a month in advance. And generally, these would be for one-night shifts or a shift maybe kind of lasting until the day but not a whole week-shift as what I kind of currently work on.

Q. Got it. Got it.

And did your duties vary as a -- you know, a hospitalist in these -- across these positions or were they similar, would you say?

A. I would say they were quite similar despite the fact that they're on different coasts. Medicine I think is quite homogenous across different medical centers.

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In Palo Alto VA, I solely work with residents, whereas in Beth Israel Deaconess, there was -- there were two different campuses, one in which I worked with residents, the other in which I kind of was more like a community doctor role where I saw the patients alone and interacted directly with the patients and the nurse and didn't have this other group of doctors assisting me as I do now a hundred percent. That would be kind of the only difference. But in general, the jobs were quite similar.

Q. Got it.

What -- I think you've answered this, but you don't have any specific oncology expertise, is that fair, as a generalist?

MR. STOY: Object to the form.

THE WITNESS: I would say that I don't have oncology subspecialty training. I do see oncology patients because oncology patients often have medical problems, general medical problems. They get infected. They can get quite sick ultimately in ways that a general internist will deal with.

I do not make decisions in terms of initiation of chemotherapy so if there is such a

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decision like that, I will work in consultation with an oncologist.

The way that hospital medicine works is that if it's a general medicine problem on an oncology patient I can -- I have -- you know, I handle that on my own. Sometimes it makes sense to consult subspecialty physicians like cardiologist, oncologist to help in the management of a patient.

BY MR. MIGLIACCIO:

Q. Got it.

And when you consult with an oncologist or cardiologist to help with the management of a patient who requires that, like how does the relationship work between the -- the hospitalist and that specialist?

A. It's a collegial relationship. I will ask them to see the patient and render -- I think to use legal terms, render their opinions, and they will provide that information to me and ultimately -- it depends on which hospital it is.

At the Palo Alto VA, I'm the -- what's called the attending of record. So I have -- ultimately the decision lies with me. So if -- you know, if you had to point to one decisionmaker, it would be me.

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That said, I'm going to very much consider what the oncologist or the cardiologist or the nephrologist, you know, the various consultants will kind of provide me. And that information will very much influence what I do.

Q. And these are for -- I think you said, and I don't want to put words in your mouth, like this is for a general medicine problems if the patient has such a problem?

A. Can you state that again?

Q. You're consulting with a specialist if that patient is in your care and they have a problem that's not, you know, an oncology problem or a cardiology problem or -- and -- am I getting this wrong?

A. If it's a general medicine problem, then it's fully within my domain to --

Q. Yeah.

A. -- make a decision without any input from a consultant.

Q. Okay.

A. If there is some type of specialized knowledge beyond general medicine that would be helpful in making my decision, then I might consult them.

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The way that it works at Palo Alto VA is that there is no oncology ward where an oncologist is the attending of record so that means all oncology patients will kind of, quote/unquote, belong to me. I am the attending of record for all oncology patients, and I'll be making -- I'm the person -- I'm the single decisionmaker if you were to name one.

If there is a specialized question that I would like input on such as a chemotherapy regimen or, you know, something that's specifically about their cancer, then I will generally consult an oncologist.

Q. Got it.

And so you, as -- as -- in your position at Palo Alto, then, if you have a patient who presents with a cancer, that patient will be under your care or will it -- or -- or jointly under your care and jointly under the care of an oncologist?

A. It's hard to define what we mean by "jointly." I would say that some oncology patients we will never consult an oncologist. Some, if their condition is purely medical, for example, you might be an oncology patient to have, like, cancer, you are being treated for this cancer, but you come to

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the hospital for pneumonia. That patient I won't consult an oncologist generally.

There are other patients where we need to make a decision about changing a chemotherapy regimen. Then I will consult the oncologist. But while the patient is in the hospital, the patient is under my care and the oncologist is secondary.

Q. Okay. I think I understand.

If somebody -- for purposes of diagnosis of a cancer and initial treatment plan, that would be done by an oncologist?

A. For purposes of the treatment plan, like the chemotherapy plan, that would be primarily done by the oncologist. They would have certainly the biggest say in that, with the caveat that the general internist and maybe even the primary care doctor, you're going to try to take the patient's wishes or the patient's preferences into consideration. You have to also consider other comorbidities that the patient has.

So it's not purely an oncology decision. It's a holistic decision that's made by generalists and oncologists.

With respect to diagnosing cancers, I think that often happens by internist, general

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internists as opposed to oncologist. Oftentimes the cancer is diagnosed initially by a patient who comes in with a complaint and we find cancer. Then after we find cancer, we refer the patient to an oncologist. So I would say the diagnosis of cancer often happens with generalists.

Q. Have you diagnosed cancer before?

A. Yes.

Q. What -- what types of cancer have you diagnosed?

A. Almost all types of cancers, I would say.

Q. What is metastatic cancer?

A. Metastatic.

Q. Metastatic, sorry.

A. That is a cancer that has spread to a distant site.

Q. Is that type of cancer frequently incurable?

MR. STOY: Object to the form.

THE WITNESS: I think it depends on the type of cancer. There are some cancers such as leukemia that are widespread. They are quite treatable and quite curable.

BY MR. MIGLIACCIO:

Q. What are the benefits of finding a cancer

early?
MR. STOY: Object to the form.
Go ahead.
THE WITNESS: I think this -- yeah, this gets to my report where there -- there could be benefits and risks of pursuing a cancer early. When you have an earlier cancer, it might be more amenable to treatment in a sense that there's less -- it has to -- I mean, yeah.
The cancer needs to be detectable, like if the cancer is small enough where it's not detectable, then you wouldn't generally operate on it to remove it. You also wouldn't give chemotherapy.
So there is, I think, still like an optimal time to be thinking about when to detect cancer. You don't want to be detecting cancer or even try to detect cancer when it's just a few -- few cells. That would be infeasible.
And there -- there is also if -- you know, the disease burden from cancer is quite advanced and for certain cancers, if it's metastatic, it becomes harder to -- the patient's life expectancy from there is -- is lower and the odds of you definitively sending that cancer into remission are

lower as well.
So it's -- it's -- it's a balance. There are -- there are risks and benefits of pursuing a cancer early, and I think there is probable an optimal time to be thinking about whether somebody has cancer.
MR. STOY: Nick, I don't want to interrupt you. If you've got -- you know, if this isn't a good spot, but we have been going for a little over an hour so, you know, whenever is a good time to take a break.
MR. MIGLIACCIO: Sure. Why don't we just take like five more minutes and then we can take a break, if that's all right.
MR. STOY: That's fine.
MR. MIGLIACCIO: I know -- and even on the East Coast here we're close to lunch but we'll sort that.
Q. Can we agree that it's generally preferable to detect a cancer before it becomes metastatic?
MR. STOY: Object to the form of the question.
Go ahead.
THE WITNESS: Yeah, I think there are just

a lot of considerations here.
BY MR. MIGLIACCIO:
Q. And I'm only asking about the benefits, not the costs. I understand that -- that, you know, and in your report you lay out your opinions. I understand that, you know, but I'm not asking you about the downsides. I'm only asking you about the upsides.
MR. STOY: Same objection.
Go ahead.
THE WITNESS: Could you state that question again?
BY MR. MIGLIACCIO:
Q. Yeah.
What -- what are the benefits, you know, not -- not the drawbacks, not the costs, what are the benefits of detecting a cancer before it becomes metastatic?
A. It's really kind of hard for me to speak generally on this. I think there are a number of different types of cancer. This might differ across different types of cancer.
Q. Sure. We can -- we can go through -- we can go cancer by cancer.
Let's talk about, like, let's say,

prostate cancer.
A. Uh-huh.
Q. Which is one example.
A. Okay.
Q. What -- what would be the benefits of -- of catching that before it becomes metastatic?
A. Even then, even if you focus on a specific type of cancer, I think it depends on things that are outside of cancer.
Potentially, if -- if -- you know, again, this is a little bit hypothetical, but, you know, if you have a patient with metastatic -- as I mentioned, if you have a patient with metastatic prostate cancer, it becomes harder to treat.
And this is kind of a very general statement. As I mentioned, I am not, you know, an oncologist.
When somebody comes into the hospital and has a medical problem, I'm generally treating that medical problem. I'm not making chemotherapy decisions, so -- and I'm also not following cancer patients long-term as well. I'm not directing -- chemotherapy is usually an outpatient regimen.
So, you know, I can speak to this in general terms, but, you know, I think that there are

just so many different factors to consider in -- there are -- it's -- it's a complicated decision that requires, you know, more than just like an inpatient hospitalization, which is what I deal with.

Q. Got it.

But we can agree that it's easier to treat, then, before it becomes metastatic, a prostate cancer?

MR. STOY: Object to the form.

THE WITNESS: Again, it depends, but I would say that in many cases, in many cases, it is treating a cancer that has not metastasized, or once a cancer has metastasized, you would need more systemic agents like chemotherapy as opposed to surgery so it rules out certain therapeutic options. And I can at least say that.

MR. MIGLIACCIO: Why don't we -- we can take a break now, a quick break, maybe just ten minutes or so. I know we need to figure out what we're going to eat here.

MR. STOY: Oh, no, that -- that's fine. I'm more worried about Dr. Chan's lunch and he's still a little ways away.

MR. MIGLIACCIO: Yeah.

MR. STOY: So let's --

MR. MIGLIACCIO: Right.

MR. STOY: Let's come back at 12:10, does that work, 12:10 Eastern time?

THE VIDEOGRAPHER: All right. We're off the record at 9:01 a.m.

(Whereupon, a brief recess was taken.)

THE VIDEOGRAPHER: We are back on the record. The time is 9:15 a.m. Pacific time.

BY MR. MIGLIACCIO:

Q. Okay. All right.

Dr. Chan, I want to ask you a few questions about your prior -- the prior reports and opinions or deposition testimony that you offered in -- I think it looks like three other cases that are listed on your CV. I am on -- looking at it right now, it looks like it's Appendix B. Okay.

Can you tell me about those cases? You can start with just -- just from the top.

A. I don't know how much I can reveal.

MR. STOY: Yeah, before you -- before you answer, Dr. Chan, I'll place an objection to the form of the question, and I'll also just caution you, I'm aware that there are protective orders in place in those cases and I believe that there's a

confidentiality order that governs any reports that you might have authored in those cases.

So, you know, with that instruction to not reveal any potentially confidential information related to those other engagements, you can answer the question to the extent you can.

THE WITNESS: Right. That leaves very little room for me to discuss this. I think I can say that you can see the parties involved in each of these cases, the dates of the case, and I was retained as an expert on the defendants' side. I think I can say that.

BY MR. MIGLIACCIO:

Q. Okay. For each of those three cases?

A. Correct.

Q. Okay. And those cases -- were those -- these are not whistleblower cases, are they? Are they -- were the cases themselves filed under seal?

A. I don't think they're whistleblower cases.

Q. Okay. Can you tell me what you know about the case, with the cases from what you know from the publicly filed documents or complaints that were filed in these cases?

A. Are the complaints public? Can I -- are we certain that the complaints are public?

Q. Well, that's -- that's why I asked if they were -- if they were filed under seal and that's, you know, what I'm trying to find out. They don't appear to me to be whistleblower cases. They appear to be --

MR. STOY: Yeah, again, I'll just -- I'll put this -- I'll reference my prior instruction and just say, I mean, I think it's okay to talk about the case generally at a high level but just not to reveal anything that, you know, would potentially be confidential. And if you -- if you're not able to answer the question with that instruction, then so be it.

But I just wanted to place that on the record.

THE WITNESS: Frank, would you instruct me to -- because I just don't know the legal -- the legal details, whether this is the -- the complaints are under seal or not. Am I allowed to discuss the...

MR. STOY: Yeah, I don't -- I don't know if -- Nick, if these complaints were filed under seal or -- or what is confidential or what isn't. I just know that there are confidentiality orders in place and --

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MR. MIGLIACCIO: Uh-huh.
MR. STOY: -- you know, aspects of his report and testimony would be confidential.
That is the limit of my knowledge so that's why I put the instruction that I did on the record.
MR. MIGLIACCIO: Yeah, I understand that. And, you know, I do know we asked for this information, these transcripts, and I think you objected to providing them.
I -- I think, you know, you could tell us the general subject matter of the case. I don't think you would be breaching any confidentiality. That -- that would be my request, that you tell us.
MR. STOY: Yeah, I mean, I think he can answer a question like, you know, what is -- what's the product that was at issue in the case or something like that. But I just think, you know, it's going to depend on the question. And if the question is a really broad one, then it's going to be difficult for Dr. Chan to be able to provide an answer.
THE WITNESS: And I would only want to reveal what's public information because I wouldn't want to divulge anything that's under confidential

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order. And I -- I just don't know what is under confidential order or not. Yeah, I mean...
MR. STOY: Well, let's wait. I don't think there's a question pending right now, Dr. Chan, so let's wait and -- wait for a question.
BY MR. MIGLIACCIO:
Q. But I mean, there was -- I just wanted to know what the general subject matter of the cases are. You know, what -- what are the cases about. You can -- you can tell me what the product at issue is. That -- that's fine.
What -- what is the product at issue?
THE WITNESS: Is that okay, Frank?
MR. STOY: Yeah, I think -- I think you can answer that question, if you know.
THE WITNESS: Right.
The -- the product at issue in all three of these cases are -- were products by Janssen pharmaceutical or Johnson & Johnson. They were two specific opioid products produced by Janssen Pharmaceuticals or Johnson & Johnson.
BY MR. MIGLIACCIO:
Q. Not Janssen, Johnson & Johnson?
A. They're -- I think -- my understanding is that Janssen is a subsidiary of Johnson & Johnson.

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Q. Okay. These -- these are all -- these were deposition -- these aren't trial testimony, this is all deposition testimony?
A. Correct.
Q. Do you know -- and you were retained by the defendants in these respective -- these three cases?
A. I was retained by Janssen Pharmaceuticals. There are multiple defendants in this case. And I was retained by one of the defendants, which is Janssen Pharmaceuticals.
Q. Okay. Did you -- was your opinion -- did you rely upon your expertise as a medical doctor or as an economist in -- in offering your opinion?
A. Both.
MR. STOY: Object to the form.
BY MR. MIGLIACCIO:
Q. All right. Have you -- has your testimony been -- been challenged in any of these three cases?
A. No.
Q. Do you know what I mean when I say "challenged"?
A. I'm not a legal expert. My understanding of your question is that there was a movement by the other side to strike my testimony or strike my

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expertise.
Q. It's to exclude or strike it, yeah, that -- that's my question, right.
A. Right.
Q. Yeah. And so the answer to that was no?
A. That's no.
Q. Okay. Did your testimony include any opinion relating to healthcare spending or pricing?
MR. STOY: Object to the form.
You can answer that question.
THE WITNESS: It's hard for me to answer that question. It related to healthcare spending. Not sure about pricing.
BY MR. MIGLIACCIO:
Q. Healthcare spending. Got it.
And when were you retained in these cases, if you can recall?
A. I believe my first contact was before the pandemic so that would mean sometime in 2020, earlier 2020.
Q. And is your work being done in those cases also with the Analysis Group?
A. Yes.
Q. Okay. In all three of them?
A. Yes.

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Q. Okay. Do you have -- what is your relationship with the Analysis Group? Are -- are you a consultant? Are you an owner? Are you an employee? Could you just shed some light on that?
MR. STOY: Object to the form.
THE WITNESS: As I mentioned, I have a -- an agreement with the Analysis Group that is -- is -- basically allows me to use their services in preparing work for or litigation consulting. I'm not an employee of Analysis Group. I'm what's called an affiliate of Analysis Group. And I believe that just means that I have worked with them in the past and I have a working relationship with Analysis Group.
BY MR. MIGLIACCIO:
Q. Got it.
What was -- I think we -- we -- we discussed this earlier, but what was the process that you used -- I think you've -- you've answered this.
Did your process for preparing your report in this case differ for your process in preparing any expert witness report in other cases?
MR. STOY: Object to the form.
THE WITNESS: Would you like to be more

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specific?
BY MR. MIGLIACCIO:
Q. I think you told me about your process this morning. I'm not sure if you finished your answer, if we finished that line of questioning.
But my question is, in the way that you prepared this report, was this -- the way you prepared this report, was it any different from -- from what you've done in -- in other cases, including these three that we just looked at?
MR. STOY: Object to the form.
You can answer.
THE WITNESS: Different from what I described earlier. So I think you are referring to my general process of reading the complaint, thinking about the question, identifying lines of inquiry that I would like more information or analyses.
Are you referring -- if you're referring to that, then that is my general process of thinking through my opinions in a case of litigation consulting.
BY MR. MIGLIACCIO:
Q. Have you -- other than these three reports -- or rather, prior testimony, have you

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offered opinions in any other litigation?
A. No.
Q. So -- so these three that you've been deposed in that are listed on Appendix B, and this case, this is the fourth case in total that you have been retained for and offered expert opinions or -- or testimony?
I'm not asking for questions about -- I'm not asking for any cases where you may be a consulting expert. I'm asking, you know, where you've been disclosed and provided opinions or deposition testimony.
A. And could you clarify to me what you mean by provided expert opinions? Is this -- is this a specific term meaning...
Q. A report, like a report.
A. A report. Okay.
Q. Yeah.
A. Thank you.
MR. STOY: Dr. Chan, my understanding is he's limiting his question to cases where you've been disclosed as a testifying expert, like in this case, not any case that you might have been retained as a consultant.
THE WITNESS: Okay.

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So the answer is yes. These -- these are the only cases that I have been disclosed as an expert.
BY MR. MIGLIACCIO:
Q. Got it.
And -- and -- and the first one looks like -- I mean, you've just started this, you've just started working as a disclosed expert with these four cases, including these three?
A. By "just started working," you can see the dates here --
Q. Right.
A. -- is that what you mean?
Q. Yeah, that -- that's right. I mean, so you -- there's not an earlier part of your career where you provided expert testimony or expert reports in other cases?
A. Correct.
Q. Okay. Got it.
I have -- in your report here you have a list of materials relied upon. Looks like that's exhibit -- it's just Appendix C of your report.
Do you have that up there?
A. Yes.
Q. So you looked at the Consolidated Third

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Amended Medical Monitoring Class Action Complaint, Plaintiffs' Memorandum of Law in support of their motion for class certification, and the Third Amended Consolidated Economic Loss Class Action Complaint.

A. Correct.

Q. And I think you testified to this earlier that you looked at Dr. Conti, Dr. Kaplan, and Dr. Song's reports.

You also, I see here, looked at the report of Dr. Panigrahy; is that right?

A. I believe so, but I don't particularly remember much about that report.

Q. Okay. And then are you aware that -- did you ask to see any other expert reports?

A. No.

Q. No.

Did you -- are you aware that the plaintiffs had put forward general causation expert reports in this case?

A. Not very aware that.

Q. Are you aware that there were reports by Dr. Etminan, Dr. Hecht, and Dr. Lagana?

A. No, I don't know those names.

Q. Are you aware of Dr. Daniel Catenacci?

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A. No, I don't know who that is.

Q. Dr. Janice Britt?

A. No.

Q. Have you ever heard of those names before?

A. I've never heard those names before.

Q. All right. What was your recollection -- I mean, what is your recollection, as you sit here today, of Dr. Panigrahy's report?

A. I don't have much of a recollection at all, actually. I don't know who that person is. I -- I might have seen that report, but I don't remember anything about it.

Q. Do you recall anything about the depositions of Judson -- I'm just -- it says, "Depositions and Declarations."

A. Oh.

Q. And it looks like there are one, two, three, four -- seven of them listed there.

A. Uh-huh. I know some of their medical conditions. I know that they're specific named -- named -- named plaintiffs and so I know -- I know their -- as I mention in my report, I know some of their medical conditions.

Q. Got it.

And then I see further below, "Data," you have various data listed, is that right, on the next page?

A. Uh-huh.

Q. And I'm just going to refer you to the "Medical Expenditure Panel Survey data."

Do you see that?

A. Yes.

Q. Who -- who gathered that data for you?

A. I directed the Analysis Group to gather that data, those data.

Q. Who is your -- who did you interface with with respect to getting that information?

A. Almost all of my calls with the Analysis Group involved the people that I mentioned earlier. All of them. Some of the calls did not include Molly Frean. But almost all of the calls involved the other four people that I named, Brian Ellman, Frank Mortimer -- Richard Mortimer, Jessica Lu, and Michaela Johnson. And I directed them as a group to get those data.

Q. Got it.

I want to look at your -- were there any conclusions that you reached that did not make it into your final report?

A. No.

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Q. And let -- let's look at your -- the invoices. I think I -- I will put -- pull those up for you if we just bear with me for a moment.

Did I do it right? Okay. It should -- they should pop up in a few minutes -- or a few seconds.

Let me know when you can see them.

A. Yes, I can see them.

(Whereupon, Chan Exhibit 3 was marked for identification.

BY MR. MIGLIACCIO:

Q. Okay. Great.

This is -- this is the invoice we were provided with.

A. Uh-huh.

Q. And it's dated February 3rd, 2022.

A. Right.

Q. And it looks like it was "For professional services rendered in connection with the above referenced case for the period ending December 31, 2021."

A. Uh-huh.

Q. Are there any other invoices or did you spend any other time on this report?

MR. STOY: Object to -- object to the

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form. I think that's two different questions.
THE WITNESS: Okay. Yeah.
BY MR. MIGLIACCIO:
Q. Yeah. First, are there any other invoices that haven't been --
A. I have not yet submitted any other invoices.
Q. Okay. Do you have -- do you have a plan to submit another invoice?
A. Yes.
Q. Okay. And what would be included on that invoice aside from today's deposition or in preparation for the deposition?
A. I haven't prepared them yet. Those would be invoices for the months of January and for the month of February.
Q. Okay. How much time -- so your report looks like it's dated January 12th, right?
A. Right.
Q. Could you estimate how much time you spent in the month of January on the report before it was signed and submitted on the 12th?
A. Off the top of my head, no. I think it was a significant amount of time given that we were up against a deadline. But off the top of my head,

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I can't tell you the number of hours.
Q. Got it. Got it.
So to -- to look, I'm looking at the first -- or rather, the second page, page 2, and there I think the people that you've referenced are listed as professionals with their titles and their hours and rates.
A. Right.
Q. Do you see that?
A. I do.
MR. STOY: Object to the form.
BY MR. MIGLIACCIO:
Q. Can you tell me, you know, Mortimer, R. Mortimer, what background that person has in terms of degrees or qualifications?
A. Richard Mortimer. I believe he has a Ph.D. in economics from Berkeley. He's a principal, which means a partner. I don't know the difference between a managing principal and a principal, but I think, broadly speaking, they're -- they're like partners at -- at AG.
Q. Fink. S. Fink?
A. Stephen Fink is another partner. He was involved -- I -- now I remember he was involved in early discussions in the case but not very much

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subsequently. Off the top of my head, I don't know what Ph.D. he has, but it's likely -- I believe he's an economist.
Q. Ellman, B. Ellman?
A. Brian Ellman, I think he has an MBA. I don't remember exactly where the MBA is from. He's an economist and he's a principal.
Q. M. Johnson?
A. Michaela Johnson, my understanding is a manager is below the level of a partner but is quite experienced, has quite a bit of industry experience as well as consulting experience. She has an MBA from MIT.
Q. I. Karagodsky?
A. I believe he was on maybe one call or two calls. I don't know him as well.
Q. Do you know what qualifications he may have?
A. I don't know in particular.
Q. Okay.
A. I believe it's all -- I would expect that all to be on their website if I wanted to look it up.
Q. Got it.
F. Balestrieri?

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A. F. Balestrieri was not on most of the call -- I don't remember that person being on calls.
Q. J. Bernard?
A. I don't remember that person being on calls.
Q. And you don't know Balestrieri or Bernard, their -- their qualifications?
A. No.
Q. J. Lu?
A. Jessica Lu.
Q. Yeah.
A. Was on almost all the calls. She has an MBA from MIT. And she's a manager.
Q. S. Livingston?
A. I don't know who that person is.
Q. M. Frean?
A. Right. Molly Frean. She has a Ph.D. from University of Pennsylvania.
Q. And did you work with her a lot on this?
A. I would say less than Jessica and Michaela, Brian, and -- she was less present than those four but she was present on a few of the calls.
Q. A. Khan?
A. I don't remember working with that person.

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Q. And N. Mwonga?
A. I don't remember working with that person either.
Q. T. Radtke?
A. I don't remember working with that person.
Q. Okay.
I. Tibrewal?
A. And I don't remember working with that person.
Q. Got it.
Were there any other people that you remember working with other than that -- that are -- that are listed here?
A. No.
Q. Okay. Did you review this bill before it was submitted?
A. I submitted my hours, but I don't review the hours of -- submitted by Analysis Group.
Q. Got it. All right.
I want to ask you some questions about the scope of your opinions here in this case.
Were you -- or are you offering any opinions on epidemiology or general causation?
A. What do you mean by "general causation"?
Q. Are you offering an opinion whether the

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contaminated valsartan at issue in this case, it can cause cancer?
A. I'm not rendering any opinions on whether valsartan with nitrosamine impurities can cause cancer.
Q. Got it.
I want to direct you to paragraph 44 of your -- of your report.
A. Okay.
Q. And what -- you state -- and -- "While NDMA and NDEA exposure may be perceived as a potential general cancer risk, it has not been demonstrated as a risk with respect to any specific type of cancer, nor has the presence of nitrosamines in certain valsartan products been shown to present a general or specific cancer risk."
Are you offering that opinion or are -- is that -- or is that an assumption that you are stating?
MR. STOY: Object to the form.
You can answer.
THE WITNESS: That's not a core opinion that I'm offering. That is something that I am citing -- it's my understanding that I'm citing from some literature that I reviewed but it's not central

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to my opinion.
BY MR. MIGLIACCIO:
Q. And you're not offering that opinion specifically?
A. No.
Q. Okay. Fair to say you did not do anything to review the epidemiology in this case or investigate general causation?
MR. STOY: Object to the form to the extent it misstates his testimony.
Go ahead.
THE WITNESS: I would say that I did not -- it's not a core opinion of mine to comment on general causation. Epidemiology is relevant in other ways, broadly speaking.
When you consider epidemiology as the prevalence of other diseases or the characteristics of people that take valsartan versus the people that don't take valsartan, there are other elements of epidemiology that are important for my opinion.
BY MR. MIGLIACCIO:
Q. Let me -- let me give you more specific question.
You didn't look at the question of -- you didn't look at epidemiology with respect to the

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question of whether the contaminated valsartan can cause cancer in this case?
MR. STOY: Object to the form.
THE WITNESS: In my report, there are some sources that I reviewed about what other agencies have said about the link between nitrosamines and the potential for cancer. But my core opinions do not concern that.
BY MR. MIGLIACCIO:
Q. Okay. Did you review any dietary studies that discussed increased risk of cancer at higher levels of NDMA ingestion?
A. Yes.
Q. You did?
A. Strike that.
I reviewed studies on the concentration of NDMA and NDEA in various dietary sources.
I also reviewed sources that had estimates, for example, from the FDA on the potential risk of cancer given nitrosamines.
Q. But you're not offering any opinions with respect to those studies?
A. No.
Q. Okay. When you say this isn't a core opinion that you're offering, does that mean this is

not an opinion that you would be testifying to at trial if there was a trial in this case?

MR. STOY: Object to the form.

THE WITNESS: I wouldn't be testifying on issues of general causation.

BY MR. MIGLIACCIO:

Q. Got it.

I want to direct you to paragraph 68 of your complaint -- of your -- I'm sorry, your -- your report where you discuss the M-E-P-S data.

A. The MEPS data.

Q. Right.

Can you tell me what MEPS data is?

A. Sure. I think that paragraph actually does a pretty good job of doing that.

MEPS is a data source that's collected by survey. It is a -- supposed to be a representative survey of the U.S. population and it collects data on healthcare utilization, healthcare -- health insurance coverage. It also has information on patient diseases and demographics. And it conducts these surveys yearly. Doesn't necessarily follow the same people all the time, but it conducts a representative survey over time on -- on -- on this type of information.

Q. Who -- and who -- what organization sponsors this or -- or, you know, collects the data?

A. I believe it's the federal government.

Q. Okay. And you directed that this data be pulled for -- for patients who took affected valsartan and non-affected valsartan?

A. As well as patients who don't take --

Q. Valsartan at all.

A. We wanted to compare that.

I believe there are three -- three sets of patients: patients who didn't take valsartan at all, patients who took affected valsartan, patients who took non-affected valsartan.

Q. Was -- how big is this sample, you know, what -- what percentage would you say it -- it captured of the population?

A. I can't -- I don't know exactly right now but I know it's a representative sample and it's -- the survey design is -- is meant to, you know, survey enough people so that it -- you know, inferences can be made with reasonable certainty on a representative sample of the U.S.

Q. And I'm just looking at paragraph 68.

You state, "I found that the rate of cancer and diabetes in the MEPS data for individuals

who took affected valsartan" -- and when we're talking about affected valsartan we're talking about the valsartan at issue in this case, right, that has the nitrosamine contamination in it, right?

A. To be clear, affected valsartan is -- we -- we would have to define it by an NDC code.

Q. Uh-huh.

A. We don't know anything more than that. We don't know what the lot was that the patient took the valsartan from. As would be the case for many of the patients in the proposed class. But we know the NDC number which means we know the manufacturer of the valsartan. And that's what --

Q. So that's what you're -- that's what you're talking about when you're talking about affected valsartan?

A. Right. So the valsartan may or may not have actually contained nitrosamines but it was from a manufacturer as specified by the NDC code.

Q. And you say 38 -- just to -- to continue that sentence, "who took affected valsartan (34.8 percent for diabetes, 20.2 percent for cancer) was similar to the rate of individuals who took non-affected valsartan (38.2 percent for diabetes and 19.1 percent for cancer)."

A. Correct.

Q. Could we agree that 20.2 percent is greater than 19.1 percent?

A. It depends on the -- the -- the number -- the number 20.2 and the number 19.1 in complete isolation, if you were just to ask me which number is greater, I would say 20.2.

But if you are doing a study on this you would have to ask what the statistical significance is between 20.2 and 19.1. You would also have to ask whether this is clinically significant given -- you know, this is not -- we're not using this as a study of causation at all.

You know, you would have to -- you would have to control for a number of different things in order to kind of ask whether there's a clinically and statistically meaningful relationship between affected valsartan and cancer. This is simply descriptive.

Q. You haven't done any of those things, statistical study or clinical study on that, right?

A. On -- on causation?

Q. Yeah. With respect to this paragraph.

A. Correct. The goal of this is not to ask whether valsartan could cause cancer -- affected

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valsartan could cause cancer.
Q. Got it.
Do you have any experience -- we talked, I think at some length, about your -- you know, your work as a hospitalist, as -- as a physician.
You know, do you have any experience setting up a medical monitoring program?
A. No.
MR. STOY: Object to the form.
You can answer.
THE WITNESS: Okay.
No. By "medical monitoring" -- do you want to be a little bit more specific, actually, before I say --
BY MR. MIGLIACCIO:
Q. Yeah.
Well, what experience do you have monitoring at-risk patient populations? I'll put it that way.
A. Patients at risk for -- for what?
Q. For cancer.
A. As a hospitalist, I don't have -- it's not part of my job as a hospitalist to monitor at-risk patient populations for diseases that have not yet become known.

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Q. Got it.
Have you -- have you done anything to monitor at-risk patient populations for diseases that have not become known? Have you done that in any other part of your work other than a hospitalist, like, you know, as -- in -- in academia or -- or elsewhere?
MR. STOY: Object to the form.
THE WITNESS: In academia, part of my research agenda is on the process of making diagnoses and part of that involves studying the properties of diagnostic tests and the -- the kind of human behavior that goes into the process of making diagnosis. So that would be related to this idea of screening for diagnoses, identifying diagnoses. That -- that's -- I think that's all I can say.
I've studied it from an academic perspective that's interested in the process of making diagnoses.
BY MR. MIGLIACCIO:
Q. The process of making diagnoses, have they related to cancers?
A. They could certainly be applied to the process of diagnosing cancers.

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Q. They haven't specifically focused on that?
A. They have not specifically focused on the process of making cancer diagnoses.
Q. What -- what -- and it sounds like it's a pretty broad or general interest of yours. Can you explain a little bit more about, you know, are you writing it -- that as an economist? Like, what is the -- like, can you give me some more meat on the bone for that?
MR. STOY: Object to the form.
THE WITNESS: I'm writing about this as both a clinician and an economist. The -- I've written economics papers on the process of making diagnoses and how to understand kind of, you know, various tradeoffs between overdiagnosis versus underdiagnosis as well as the accuracy of the diagnosis process.
Some -- some providers may make both more Type I errors and Type II errors, and it's not a tradeoff between those providers and other providers.
So this economics literature is focused on systems of care, provider behavior, and kind of specific objects of diagnostic errors such as Type I errors and Type II errors.

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I have applied this type of research for a clinical audience as well. I'm working on an opinion piece in JAMA for a clinical audience that talks about diagnostic efficiency, what makes for diagnostic errors, and how can we improve the quality of diagnoses.
BY MR. MIGLIACCIO:
Q. These -- this research, is it fair to say, has not focused on specific patient subpopulations who are at risk for cancer?
A. It has not specifically focused on that, so -- population. It has kind of viewed the process of diagnoses more broadly.
But, you know, the diagnosis of cancer is one of the major -- one of the -- one of the most important kind of domains of diagnostic decision-making. I would say cancer is -- is quite important in terms of diagnostic error, misdiagnoses, and how we can improve our process of making diagnoses.
Q. Do you have -- I think -- now -- I think I asked this one way. I'll ask it another way.
Do you have any experience administering a medical monitoring program --
A. No.

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Q. -- to monitor a group?
Before you offered your opinion here in this case, have you had any litigation experience with opining relating to -- offering an opinion with respect to medical monitoring?
A. With respect to medical monitoring for patients at risk for cancer?
Q. Yes.
A. No.
Q. Okay. Any other aside from that narrow group, anything broader?
A. Some of my other opinions relate to physician behavior. And physician behavior -- an important part of physician behavior is deciding whether a certain treatment is appropriate for a patient or deciding whether a certain test is appropriate for a certain patient. And that relates to diagnoses, making diagnoses.
Q. Okay. Do you know of any medical monitoring programs that have been, you know, approved by courts?
MR. STOY: Object to the form.
THE WITNESS: I haven't researched which medical monitoring programs have been approved by courts.

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BY MR. MIGLIACCIO:
Q. Got it.
Have you looked or researched into -- of any medical monitoring programs in the United States that are not approved by courts? And I'm talking about programs outside of the guidelines that you reference in your report.
MR. STOY: Object to form.
THE WITNESS: Can you state that again, please?
BY MR. MIGLIACCIO:
Q. Yeah.
Have you looked at or researched any medical monitoring programs in the United States that -- that aren't court-approved, you know, like there's the 9/11 medical monitoring program, is that something you've looked at, ever?
MR. STOY: Object as to form.
THE WITNESS: I can't recall whether I've looked at that or not, whether I've looked at the 9/11 program.
BY MR. MIGLIACCIO:
Q. For -- that -- that was just an example. I mean, you know, there may be others.
But you can't recall any others?

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A. No.
Q. Okay. I want to direct you to paragraph 32 in your report.
A. Okay.
Q. Okay. And I'm -- I'm going down toward the -- I guess it's the one -- second -- the third sentence where -- that begins, "In contrast."
And it says, "In contrast the screening guidelines I discuss in this section refer to the testing of an apparently healthy, asymptomatic target population."
A. Right.
Q. Would you agree that the screening guidelines that you have discussed in this report are for the average risk population?
A. I am not sure about that. The guidelines -- some of these guidelines are for smokers, for example. I don't know what you mean by "average risk population."
I -- here, I say patients without symptoms.
Q. Aside from smokers -- smokers have a special set of guidelines, right?
A. Right.
Q. I think you discussed them. And maybe you

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might have discussed one other. But smokers have -- they get low-dose CT scans.
What is the guideline for smokers again?
A. I believe that's in my report in Figure number 1.
Q. Figure 1. Okay.
A. Yeah. Would you like to turn to that?
Q. Sure.
A. Okay. So for lung cancer, the USPSTF has a recommendation of "B" for adults aged 50 to 80 with a 20 pack-year smoking history who currently smoke or quits within the last 15 years.
Q. And you reference the USPSTF; is that right?
A. Yes. Uh-huh.
Q. Who -- what organization is the USPSTF?
A. The USPSTF is the U.S. Preventive Services Task Force, and that is the main organization that comes up with guidelines related to preventive services.
My boss is a member of this task force. It's a -- it's -- it's a high profile task force that considers evidence on various -- various population-based guidelines -- I'm sorry, various population-based interventions that you could do

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or -- or -- or screening tests. And it issues recommendations based on this evidence.
Q. Have you ever been a member of the USPS -- USPSTF?
A. No.
Q. Okay. The NCI, you referenced the National Cancer Institute. What -- what does the NCI do?
A. The National Cancer Institute is an organization that is an authority on cancer, various -- and in this -- and in this setting, the NCI -- I refer to the NCI if it has any guidelines with respect to screening of cancer.
Q. Are you familiar with the National Comprehensive Cancer Network, or NCCN?
A. I've heard of that organization.
Q. Do -- what do you know about the NCCN?
A. I know that that organization also puts out quality measures on cancer care. I'm not sure I know very much more about the NCCN.
Q. Is it fair to say that the development and treatment -- the development and establishment of treatment guidelines for cancer has not been a focus area of your research; is that fair to say?
MR. STOY: Object to the form.

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THE WITNESS: Could you say that again?
BY MR. MIGLIACCIO:
Q. That is it fair to say that the development and establishment of treatment guidelines for cancer has not been a focus of your research?
A. The --
MR. STOY: Object to the form.
THE WITNESS: The development and -- of cancer -- the development of cancer guidelines has not been a focus of my research. I have focused on other types of guidelines in my research.
BY MR. MIGLIACCIO:
Q. What other types of guidelines have you focused on?
A. Specifically, I focused on guidelines for the treatment of atrial fibrillation, which in -- you know, which are similar in ways that you are developing guidelines based on evidence. There are risks and benefits for recommending a certain course of action for a broad set of patients. And in this particular research, I'm interested in how providers respond to guidelines.
Q. So could you -- could you direct me to any papers you have on that subject?

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A. Yeah. Let's turn to the CV.
Q. Okay.
A. This is in -- under working paper number 2 on page A-2.
Q. A-2?
A. Yeah.
Q. Okay.
"Fixing Misallocation with Guidelines"?
A. Correct.
Q. "Awareness versus Adherence"?
A. Correct.
Q. Got it.
NBER, National Bureau of Economic Research?
A. Exactly.
Q. And you have an appointment or -- with that group right now?
A. I do. I have an affiliation with that group.
Q. Okay. You've had that for a long time?
A. I've had -- well, it's something that you need to be nominated and I guess approved for by the -- this is something that I got in my first year as a faculty. It's called -- it's in my CV under "Faculty Research Fellow, National Bureau of

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Economic Research."
Q. Got it. Got it. Got it. Okay.
And this working paper was published in July of last year?
A. That was the most recent version of the paper, correct.
Q. Oh. Has -- it's changed over time? Have there been --
A. Yeah, you can see previous versions of the paper if you go to that website.
Q. Got it. Got it.
And have they all -- have they all related to atrial fibrillation or have they -- those papers changed their focus?
A. The -- the empirical focus of the paper has been on atrial fibrillation throughout. The paper of course is motivated much more broadly. It's motivated about how do we form guidelines, how do physicians respond to guidelines; if you're trying to optimize outcomes for a patient population, how should you best make use of guidelines.
Q. Your coauthors, there are -- it looks like one, two, three -- four other authors?
A. Right.

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Q. Have they been the same authors on -- on this series of papers over time or has it -- has it changed?
A. I believe it's been the same for -- ever since we've had a working paper, it's been the same.
Q. Are they physicians or economists or both?
A. Both.
Q. All right. So all four are physician/economists?
A. Oh, sorry. Two of them are -- three -- two of them economists. Leila Agha and Jason Abaluck are economists. Daniel Singer is a physician. And Diana Zhu is a Ph.D. student in economics.
Q. Got it.
Have you contributed in any way to the development of a USP -- P -- USPSTF guideline relating to cancer?
A. No.
Q. Have you contributed to the evidence-based reviews provided by the NCI as referenced in your report, I think paragraph 35?
A. Paragraph 35.
Q. I mean, I'm not saying that you did. I'm just asking. That -- that's my -- I think you --

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you discuss the evidence-based review that NCN does -- NCI does?
A. Uh-huh.
No, I have not.
Q. Okay. Do you consider yourself to be an expert in the formulation of the derivation of the original clinical guidelines in the screening for cancers?
A. The formulation or derivation?
Q. Uh-huh.
A. Could you clarify that?
Q. Or the creation --
A. Okay. Do I --
Q. -- of the clinical guidelines?
A. Okay. Sorry, could you restate the question?
Q. Yeah.
A. Do I consider myself an expert in?
Q. In the creation of clinical guidelines for the screening of cancers?
A. No.
MR. STOY: Object to the form.
Go ahead.
BY MR. MIGLIACCIO:
Q. Can we agree that it can take a long time

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to get screening procedures added to national guidelines at USPSTF?
MR. STOY: Object to the form.
THE WITNESS: I don't know what I would characterize as a long time. I think it's -- there's a reason why we don't -- we require a certain level of evidence in order to change a guideline. Because evidence is incremental and because evidence can change we want to have a certain level of certainty whenever we have a type of guideline.
And as I discuss in my report, when the guidelines are for screening, we have to be very cognizant of the potential risks of screening. And that's why I think we would have just a higher bar to -- to, you know, recommending a guideline for a -- a new guideline for screening.
BY MR. MIGLIACCIO:
Q. And for -- for example, you know, can we agree that it took many years before low-dose CT scans were added as a guideline for tobacco users?
MR. STOY: Object to form.
THE WITNESS: I don't know the particular history of that. Are you specifically referring to low-dose CT scans as opposed to chest x-rays?

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BY MR. MIGLIACCIO:
Q. Uh-huh.
A. I would need to look into the history of when low-dose CT scans were available. And, you know, there is a certain -- as I discuss in my report, one of the considerations of using a certain technology for screening is characterizing the performance of that technology in terms of false positives and false negatives as well as characterizing any risk that may come from using this new technology of a CT scan versus a chest x-ray. I would imagine even if it's low dose, there would be much more radiation than the chest x-ray.
Q. Can you -- there'd be more radiation from a low-dose CT scan than a chest x-ray?
A. Than a chest x-ray. I would imagine that a CT scan -- a usual CT scan has I think orders of magnitude, more radiation than a single plain film chest x-ray, and even if it's a low-dose CT scan I would have to -- I would have to look at -- review the evidence, but I think there would still be some concern of higher radiation from a low-dose CT scan than a chest x-ray.
Q. But you're not offering that opinion here and now? You don't know the answer to that without

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reviewing the information?
A. Correct. I don't know in that specific case. But I would -- and what -- but what is central to my opinions is that all of these screening tests have potential risks both in terms of false positives and false negatives so that's why you need to understand the testing characteristics for a certain screening procedure but also some of these screening procedures have physical risks such as radiation.
Q. I will be going through more of your report. I think you -- so to -- I think you have -- you have stated in your report that certain thresholds need to be met.
And I think that's what you're saying now before a screening guideline is made; fair to say?
A. Correct.
Q. And I'll direct you to some portions of your report on that in -- in a moment.
MR. STOY: Nick, before we --
MR. MIGLIACCIO: Yeah.
MR. STOY: If you're about to jump to another topic, we've been going a little over an hour now.
MR. MIGLIACCIO: Yes.

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MR. STOY: Would this be a good time for a quick break?
MR. MIGLIACCIO: Yeah, I think so. Why don't we go on off the record and we can discuss how long.
MR. STOY: Okay.
THE VIDEOGRAPHER: Off the record at 10:19 a.m. Pacific time.
(Whereupon, a brief recess was taken.)
THE VIDEOGRAPHER: We are back on the record. The time is 10:44 a.m. Pacific time.
BY MR. MIGLIACCIO:
Q. Okay. Great. All right.
Dr. Chan, I think we were talking before the break about thresholds and I want to ask you some questions about that.
I direct you to paragraph 16 of your report.
A. Okay.
Q. Okay. And I want to direct you to midway through it, there's a sentence that says, "While there are many risk factors for the nine types of cancers identified by Plaintiffs in this case, a high threshold must be met for a risk factor to be incorporated into a guideline to screen populations

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of asymptomatic patients."
And then you say below, "In my opinion, the evidence related to NDMA and NDEA in affected valsartan fails to meet the bar required to use a uniform screening process on a broad population of asymptomatic patients."
Do you have a -- what do you mean by "a high threshold must be met for a risk factor to be incorporated into a guideline to screen populations"?
A. I believe there's another part of my report that kind of elaborates on this threshold.
Q. Okay.
A. Right. So I think paragraph 35 gets at this here. Here I talk about the USPSTF guidelines. But I think it's -- it's broadly applicable to the general framework we would need to consider a threshold.
Would you like me to read the relevant sentence?
Q. Sure.
A. "USPSTF recommendations are based on a framework which considers questions such as whether screening may reduce morbidity; whether sufficiently sensitive and specific screening tests are

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available; whether early detection and treatment makes a difference in morbidity; and what the potential harms of screening and subsequent screening-implied treatment may be."
So this sentence does not specifically mention the agent in question, such as NDMA and NDEA, but the agent in question and the potential cancer type related to this agent bears on many of these factors in this sentence such as whether a screening may reduce morbidity.
The agent needs to be sufficiently associated with cancer in the sense that we expect sufficiently high number of patients associated with this agent or this risk factor, for screening to reduce morbidity.
Q. And you're -- but you are not offering, as we discussed, a general causation opinion here, you're not offering an opinion on -- on what you've just said?
A. I'm not --
MR. STOY: Object to the form.
Sorry, Doctor.
THE WITNESS: It's not my assignment to offer an opinion on causation, but as I mentioned earlier, I refer to sources that have some estimate

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of the associated -- a potential associated cancer risk.

So, for example, in paragraph 88 of the report, I cite a very conservative estimate, meaning like a worst -- somewhat of a worst-case scenario that the FDA has estimated that the highest dose of valsartan, one additional cancer case may be expected per 8,000 patients exposed to NDMA containing valsartan. And one additional cancer case maybe expected per 18,000 patients exposed to NDEA containing valsartan.

Q. Yes. And I -- yeah, I do -- I do see that.

"The maximum exposure to NDMA from affected valsartan is approximate" -- "of 29,498 micrograms is approximately 12 times the lifetime acceptable intake, implying an excess cancer risk of 12 in 100,000 or approximately 1 in 8,000," right, of paragraph 92?

A. Yes. I was reading paragraph 88 but part of 92 also mentions.

Q. I'm sorry, I think I said paragraph 93, but I may have that wrong, I may have said -- given -- yeah, I was referring to paragraph 93.

A. Okay. Yep, I see that you're reading

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paragraph 93.

Q. Yeah.

A. And I was reading from 88.

Q. Is this 1 in 8,000 risk an acceptable cancer risk to you as a physician?

MR. STOY: Object to the form.

THE WITNESS: I'm not sure what you mean.

MR. STOY: I'm sorry. I just want to add an objection to the extent it's outside the scope of -- of Dr. Chan's report.

Go ahead. I'm sorry.

THE WITNESS: Right. I'm not sure what you mean by "acceptable cancer risk," and I'm commenting on this not as a physician per se, but in my analysis of what organizations like the USPSTF and NCI have -- what types of risk factors have made it into a guideline.

So if you look at Figure 1 and Figure 2 of my report, particularly Figure 2, there are a number of different risk factors that are associated with all of these nine cancers. And in my report, I talk about the magnitude of some of these risk factors.

Some of these risk factors are quite -- much higher than the 1 in 8,000 for NDMA and 1 in -- did I say 18,000 for NDEA. And that is the basis of

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my saying that the R or the threshold is quite high.

If you look at the risk factors that make it into a screening guideline, as I read, there are a number of different criteria that need to be met and one of those criteria include a high risk of cancer.

BY MR. MIGLIACCIO:

Q. And is your opinion, is that 1 in 8,000 is not a high risk of cancer?

A. I think compared to some of the other risks that I mention in my report it's much lower.

Q. Where do you draw the line as a high risk or low risk, what is the -- what is the numerical threshold? Do you have one?

A. I'm not sure if I can say precisely where it is, but I can say that 1 in 8,000 is an order or two of magnitude lower than some of the other risks that we have and many of these other risks don't make it into broad population guidelines.

Q. What other risks that we have are you referring to?

A. Yeah, it's in my report. If I can refer to that.

For example, radiation, I think is one thing that I do mention in my report.

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Yes, so I believe this is in figure -- this is in Figure 2 and paragraph 42 of my report.

The risk for lung cancer including one first degree family member affects -- so family history, you know, you have, like, a relative risk of 2.59 -- 57. You have radiation therapy at relative risk of two.

And if you convert these to number of people you would need to screen to get one cancer, they would be much higher than the number that I just cited for NDMA and NDEA.

The relative risk for lung cancer of 8 of -- of a 20- to 30-pack history of smoking is 8 -- 8.2. So that's substantially even higher than the other relative risk that I just cited.

And if you convert these to number of people you would need to screen to find one patient with a -- who truly has the cancer they would be much, much -- much lower than you would need for NDMA and NDEA.

Q. What is the type of -- of screening that's done for lung cancer?

A. I believe that's in my report. That should be in Figure 3.

So in Figure 3, there are a number of

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different potential options and the one that is recommended is low-dose CT scan currently.
Q. And as you testified earlier, that may have a higher radiation dosage than a regular x-ray?
A. Higher, correct.
Q. Higher. Got it.
So that there is, in your opinion, a certain degree of risk that is associated with a low-dose CT scan?
A. Right.
Q. Got it.
I see in paragraph 42, you cite to epidemiology studies in footnotes 59 and 60.
A. Uh-huh.
Q. But you have not done so with respect to NDMA, you have not looked at the -- right, at least I don't see the citations for the -- for epidemiology studies and relative risk associated with NDMA. Or if I am missing something you can point it to me.
MR. STOY: Object to the form. Object to the extent it mischaracterizes the report.
Go ahead.
THE WITNESS: The report does cite the FDA calculation for the number of additional cases of

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cancer potentially in -- you know, with the highest dose of NDMA and NDEA. And that I think can be converted to a relative risk. I'm not sure if in the report we've done that, but it could be -- it could certainly be converted to a relative risk.
BY MR. MIGLIACCIO:
Q. Fair to say, though, the sole basis for your opinion, then, on the -- I'll -- what I'll say is your view that there's a low relative risk, and you can tell me if I'm wrong about that, is the FDA citation that you give here; is that fair?
A. I don't think it's the sole basis. There are other sources that I do cite that are even -- that have a lower to potential -- other sources don't demonstrate a risk of cancer in humans to -- you know, based on on NDMA or NDEA, and I believe I've cited one of those sources.
So I think there's a range of potential linkages between NDMA and NDEA to cancer, in particular, valsartan -- affected valsartan to cancer. As I said earlier, causation is not, you know, my -- my main area of focus here.
But the magnitude of any potential linkage is relevant to my opinions and that's where I believe the FDA estimate of the linkage is perhaps

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the most conservative in the sense that they are considering the highest dose of NDMA and NDEA and over a long period of time.
Q. And you haven't looked at this, though, to offer that opinion, you're -- this is like ancillary to -- to your opinion?
A. This is --
MR. STOY: Object -- hang on, Doctor.
Object to the form of the question to the extent it mischaracterizes.
Go ahead.
THE WITNESS: I would characterize this as this is an input into my opinion in the sense that I've looked at a range of sources that have various linkages between NDMA and affected valsartan to cancer. Some of which are no linkage.
And if I take the most conservative estimate, meaning the highest risk, and compare that to some of the other risks that I list in paragraph 42 and Figure 2, that linkage between NDMA and NDEA and kind of more importantly the linkage between affected valsartan and cancer is low.
BY MR. MIGLIACCIO:
Q. And, you know, to be clear, you have not looked at any of the other plaintiffs' expert

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reports other than the ones we have discussed already today?
A. Correct.
Q. So the threshold that you're identifying, I see that you cite to paragraph 40 in -- you cite in paragraph 35 to a study or an article in footnote 47.
Do you see that? By Vearrier and Greenberg?
A. Correct.
Q. That -- that's the sole citation you have for that -- that sentence that you read to me earlier about what USPSTF recommendations are based on, right?
A. That is the only citation in that footnote, but I don't think it's -- it's not really the only source that I have for that statement. In fact, that might be a -- you know, this -- this citation is about the implementation of medical monitoring programs following potentially hazardous exposures, a medical-legal perspective, this seems like it's a comment -- it's a perspective in a framework on how we should think about medical monitoring programs.
But there -- if you read all of the USPSTF

recommendations, which are in separate cites, I don't kind of list them as cites for that particular sentence, but they could very well be related. If you read any of those USPSTF recommendations, they do walk you through a way of thinking about this framework.

Q. So fair to say there is -- you don't have -- or you're not offering a numerical threshold -- or you're not offering an opinion that there is a numerical threshold, but you just, you know, add as to whether a monitoring program would be appropriate?

A. I think based on the sentence that I read in paragraph 35, this is a multidimensional consideration. It can -- it depends on a number of different considerations and therefore, if it depends on all of these things, it shouldn't -- one threshold, it wouldn't be a single scale or threshold based on the risk of cancer.

That's one important consideration, but there are other considerations that I just read from that sentence.

Q. Uh-huh. So when you talk about threshold, you say "a high threshold," you know, I think you used that terminology maybe once, twice, three times

in the report. That's -- what you're referring to is this paragraph?

A. What I -- yeah, when I say "threshold" I don't mean a single number that is -- maps to the risk of cancer. What I mean is a decision-making threshold that considers a number of different factors and a lot of these factors are individualized for a clinician to reach a decision-making threshold for a given patient.

And there's a separate threshold that you might make for a guideline to screen a population of asymptomatic patients and this would also similarly consider a number of different factors here that I just read.

Q. And that's -- that second threshold is the one that I -- I was talking about.

A. Right.

Q. And that's what I think you're referring to in your report for -- for the guidelines?

A. Correct.

Q. Going back to paragraph, I think 32, and I think I asked you about the -- the types of -- the screening guidelines that you have cited elsewhere in your report and -- and you've referred to a broad population of asymptomatic patients.

Does that mean a group of people who are not at increased risk, excluding of course the smokers that we've talked about?

A. No. I think by definition, any population that you're going to specify screening for has to be at increased risk. What I mean by asymptomatic means that they don't have symptoms.

So if you are talking about lung cancer, they don't have a cough that you want to kind of evaluate further. If you're talking about colon cancer they don't have abdominal pain. They don't have symptoms, but they could be at increased risk.

Q. What are the increased risks that are -- that are found in the broad asymptomatic population?

A. I believe that's in Figure 2.

Q. Okay.

A. Figure 2, I list the number of different risk factors for each type of cancer in the last column, Figure 2.

Q. Colorectal. And we've discussed this already, colorectal and lung, there are these additional screening guidelines for people at increased risk, right?

A. There are guidelines to screen certain populations based on age in the setting of

colorectal cancer, and based on age and smoking history in the setting of lung cancer.

Q. Got it.

Those are used to define populations for an asymptomatic testing but -- and in -- correct?

A. I'm sorry?

Q. I said those are used to define the populations for asymptomatic testing?

A. Those are used to -- correct. Correct.

Q. Would you agree that blood tests and stool tests proposed by Dr. Kaplan are not highly invasive?

MR. STOY: Object to the form.

Go ahead.

THE WITNESS: Do you want to define "invasive"?

BY MR. MIGLIACCIO:

Q. Yeah, I mean, I think you talk about the risks that certain test -- tests may -- may have for people. And I think you said physical risks earlier?

A. Right.

Q. I think you talk about risks. Do blood tests or stool tests present physical risks to patients?

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A. They don't -- you're right that they don't present physical risks. The physical risks would be quite minor. But they are not great tests. And if you look at Figure 3, you'll see that there's really not a recommendation to use many blood tests in most cases.

And even for stool tests, you know, a lot of people have colonoscopies rather than fecal -- what are called blood -- you know, basically stool tests for colon cancer.

So what I also talk about in my report is not just the risk of a physical harm from the screening procedure, it is the risk of getting a false positive and false negative.

And if you use tests with lower sensitivity or specificity to screen in a population that is not at particularly high risk for the cancer, you're at risk for getting false positives and false negatives, and that can harm the patient. There are ways in which that can set the patient down a path that would be harmful.

Q. You talk about scrutiny-dependant cancers. I think in paragraph 53.

A. Uh-huh.

Q. And I think you reference four cancers:

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prostate, breast, thyroid, and lung.

Do you see that?

A. Yes.

Q. Do you understand that there are nine cancers that Dr. Kaplan has offered an opinion about in this case?

A. Yes.

Q. Okay. Are you offering the opinion that the following cancers are what you'd call scrutiny-dependent: liver, stomach, colorectal, intestinal, esophageal, bladder, pancreatic, and blood?

A. These -- what I cite as scrutiny-dependent cancers in this paragraph are examples. I haven't ruled out the possibility that other cancers could also be scrutiny-dependent.

Whether a cancer is scrutiny-dependant or not depends on the technology that we have. It may not be scrutiny-dependant now but it could be scrutiny-dependent later. It depends on the -- of course the nature of the cancer, but also the nature of treatment that we have available for that cancer.

So what makes it scrutiny-dependent is that our technology to detect the cancer, if we look hard enough, has gotten better. But our technology

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to treat the cancer has not necessarily gotten better. And the underlying nature of the cancer when it is, you know, newly detectable may not imply anything toward quality of life or for life expectancy.

So the definition of scrutiny-dependent could change over time depending on the technology to screen and the technology to treat.

Q. Got it.

Do you have any evidence, though, or any opinion right now that any of those seven cancers I just detailed are scrutiny-dependent?

A. I haven't thought hard enough -- haven't thought about it long enough at this point. I could return to that at some later point but at this moment of the deposition, I can't offer an opinion on that.

Q. Got it.

Is there any way for a physician to know that a certain cancer when caught very early, let's say prostate cancer, I'm just giving an example --

A. Uh-huh.

Q. -- you know if it's caught very early, if it is going to be aggressive or if it is not going to be aggressive?

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A. I think there are ways to have an educated guess. Not being an oncologist myself so I don't consider myself an expert on prostate cancer, but I'm -- know more about prostate cancer than the average person.

There are ways where you could consider epidemiology, what happens to the average patient that you diagnose with prostate cancer with a given PSA test, for example. And is there variation when you have a given PSA test. That kind of -- and reflects on the quality of the PSA test, which we know to be not great. When you have patients who can have the same PSA test but have -- you know, a test could be neither sensitive nor specific if like the test -- knowing the test doesn't give you that much information.

So, again, you can know the general epidemiology of what happens for a patient with these given characteristics and their diagnosis with prostate cancer. You could also ask what happens when you have additional clinical information such as the PSA test and what that means for the possibilities of whether that cancer is going to be aggressive or not.

Q. But I think you said it would be an

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educated guess, really, there's not a way to know whether?
A. We -- we --
Q. -- it's aggressive or not?
A. It's -- it's kind of a spectrum. We wouldn't know in general with certainty. But we would have an educated guess and sometimes we would know more and sometimes we would know less.
Q. Uh-huh. So from the time, let's say, a prostate cancer is -- it's diagnosed, right, by a -- by a biopsy, right? Am I wrong about that?
A. You know more -- you know the most about it, yes, after you've actually taken tissue out and you've kind of looked at that tissue with -- with pathology.
Q. Right. That's -- is that when the prostate cancer diagnosis is made or is it made based on PSA levels?
A. It would require tissue to diagnose prostate cancer.
Q. So if you do -- if you take a tissue pathology of prostate cancer, can you know with the result of that pathology report whether it's an aggressive cancer or not?
A. It would give you more information. I --

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again, that would depend on the characteristics of the pathology test. And the pathology test is probably the best you can know up until that point without kind of foresight into the future.
But I would have to review the characteristics of the pathology test and the epidemiology associated with different histologies that you might find on the pathology test.
Q. So fair to say that without foresight in the future you're not going to know the answer, I mean, and nobody has a crystal ball with that foresight to know if -- if that particular tissue biopsy represents an aggressive or less aggressive form of prostate cancer?
A. I think it's fair to say we don't know with a hundred percent certainty. But I -- I would have to review the evidence to tell you how much uncertainty there is with a tissue biopsy.
Q. How much uncertainty as to?
A. The aggressiveness of the cancer or the life expectancy --
Q. Got it.
A. -- of the patient.
Q. Got it. Got it.
Is that something that you have done in

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your -- I mean, have you studied tissue biopsies of cancers or is this something that you're -- kind of have more general expertise in?
A. This is something as a hospitalist I'm familiar with how patient care, the process of patient care involves tissue biopsy in order to prognosticate and in order to make treatment decisions and in order to diagnose.
Q. Got it.
It's not something that you do as -- on a -- on a regular basis?
A. I don't -- if you could clarify what you mean by what I do, so I don't -- I'm not a pathologist. I'm a hospitalist.
As a hospitalist you do kind of make plans to get a biopsy and do -- use the results of the biopsy for decisions. You often do this in concert with other experts such as oncologists. So I -- I'm familiar with how they're used with the caveats that I just told you.
Q. Got it.
I think, you know, I've asked you and you've told me now several times about, you know, general causation or lack thereof with respect to your opinion.

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I want to ask you about the -- the -- the threshold that the plaintiffs have placed in their class definition.
Have you -- have you reviewed that threshold, lifetime cumulative threshold that's in the third amended complaint?
MR. STOY: Object to the form.
THE WITNESS: Have I reviewed the threshold, is your question?
BY MR. MIGLIACCIO:
Q. Yes. Yep.
A. I'm familiar with the statement of some threshold in the acronym lifetime -- LCT, lifetime cumulative threshold.
Q. Got it.
Are you offering any opinions with respect to that threshold?
MR. STOY: Object to the form.
BY MR. MIGLIACCIO:
Q. Or LCT?
A. I'm offering opinions on whether that threshold is feasible to assess.
Q. In what -- in what way?
A. In the sense that in my report I describe a number of different sources of cancer, a number of

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different sources of nitrosamines, not just affected valsartan, but potentially other drugs and other dietary sources, and endogenous production of nitrosamines.

And in my report an opinion of mine is that it would be difficult to assess whether somebody has passed the lifetime cumulative threshold. Aside from the question of whether the lifetime cumulative threshold is actually a valid concept.

Q. Do you understand that the lifetime cumulative threshold set forth by the plaintiffs defines a risk or exposure floor?

MR. STOY: Object to the form to the extent it assumes facts not on the record.

Go ahead.

THE WITNESS: Frank, I can barely hear you.

MR. STOY: I'm sorry.

I made an objection to form to the extent it assumes facts not on the record. I'll speak up.

THE WITNESS: Okay.

And, Nick, can I hear you ask the question again?

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BY MR. MIGLIACCIO:

Q. Yes.

I mean, do you understand that the lifetime cumulative threshold set forth by the plaintiffs defines a risk or exposure floor, that it's a floor?

A. I'm not sure I understand that because, again, I'm not an expert on causation. But if it's possible that nitrosamines don't cause cancer, then I'm not sure how it would set a floor unless if the floor includes zero.

Q. Got it.

And if it's possible, let's just say for -- hypothetically, for your purposes, I guess, that nitrosamines do cause cancer and that the -- the threshold and the system, the scoring system set forth by the plaintiffs details how much nitrosamine is in a particular dosage, would -- then would you understand that -- that it would set a floor?

MR. STOY: Objection. Incomplete hypothetical.

Go ahead.

THE WITNESS: I'm not sure how that would be done. If -- first you -- as you say, you would need to say that nitrosamines do cause cancer. If

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we haven't answered that yet, then I'm not sure how we even know a lower bound on the -- on the causal effect of nitrosamines on cancer.

BY MR. MIGLIACCIO:

Q. I -- I was asking you to assume that. But that -- that's -- I'm asking you to make that assumption.

A. Okay. Sure.

Q. Yeah.

Then do you understand that it would set a -- a floor, an -- a floor, a risk floor?

MR. STOY: Same objections.

THE WITNESS: Well, under the assumption that we have a lower bound, then by construction it does set a floor.

BY MR. MIGLIACCIO:

Q. Got it.

How -- I want to ask you some questions about pricing, which I -- I think you detailed elsewhere in -- in your report. I think you use an example of Massachusetts General as one of the hospitals. I think Dr. Song might be associated with Massachusetts General.

A. We all love MGH.

Q. Yeah. Yeah, yeah.

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Do you know Dr. Song?

A. I -- I do.

Q. You do. Yeah.

A. Yeah.

Q. Yeah, I can't imagine there are that many MD-Ph.D. experts out there in the world. Probably a very small number, I guess.

A. Yeah. I think less than 20 probably.

Q. Wow, wow, wow.

So my question about MGH, I mean, is it fair to say that MGH has a -- has a lot of market power?

MR. STOY: Object to the form.

THE WITNESS: I'm not sure exactly how I would characterize it, but I know that MGH has been involved in litigation regarding its market power.

BY MR. MIGLIACCIO:

Q. Okay. Did you have any involvement in that?

A. No.

Q. Let me -- I mean, I think we've taken a break. I'm not -- I do want to go back to one of the -- you know, I want to about explore a little bit more this question of -- of your -- your testimony in the -- in the -- in the opioid

litigation.
You know, Frank can obviously object if -- as -- as necessary, but I did want to see if you could testify more about, you know, the subject about -- you know, the subject matter in a general matter.
A. More about what? Sorry?
Q. The subject matter of that litigation in a -- in a general matter, if you could give us that in -- in a general matter without divulging any confidential information?
MR. STOY: I -- I think the challenge there, Nick, is with a question that broad he might not be comfortable answering it because he's not sure where those lines are, right.
MR. MIGLIACCIO: Uh-huh.
MR. STOY: A more specific question he might be able to give you a specific answer.
MR. MIGLIACCIO: Well, how -- let me try to -- I'll try to narrower it down a little bit.
Q. Can you tell us how the testimony in those cases is similar to the testimony you're offering here?
A. Sort of -- like thematically, is that -- is that your question?

Q. Thematically or subject matter. You know, is the subject matter similar. Both of those questions, thematically and subject matter.
MR. STOY: Dr. Chan, if you can ask -- if you can answer that question from a high level, I think it's okay. So that would be my instruction to you.
THE WITNESS: From a high level, I am relying on my expertise as an economist, as a clinician, and as somebody who is familiar with health policy.
BY MR. MIGLIACCIO:
Q. Do -- can -- did those other cases, do they involve class action claims?
A. No.
Q. There are transcripts of those depositions, is that right, the ones that you took -- that you gave?
THE WITNESS: Sorry. Go -- go ahead, Frank.
MR. STOY: No, you can answer that. Go ahead.
THE WITNESS: I don't know if the transcripts are public, in the public domain.
MR. STOY: He just asked you if

transcripts exist.
THE WITNESS: Oh.
BY MR. MIGLIACCIO:
Q. That's what I'm asking.
A. Yeah. Yeah, transcripts exist.
Q. They do exist, okay.
And do you know, are they -- do you know if they are marked confidential or not in their entirety?
A. I don't know.
Q. Okay. Got it.
Is that litigation currently ongoing? Can you answer that question?
A. I am not sure. I think so.
Q. Okay. I'm not -- I don't want to ask you anything about it. Just if it -- okay. Okay.
So going back to -- to this question on, you know, Massachusetts General's market power or -- or -- you know, is it fair to say that the prices in one area of the country can, you know, differ in -- for instance, Massachusetts General may have high prices, but if you go to rural western Massachusetts the prices would be lower, of medical care, medical services?
A. It's fair to say that prices differ a lot

across different hospitals and different payors. I am not sure if your prediction is true where Massachusetts General would necessarily have higher prices than western Massachusetts.
And I think part of the analyses that I lay out is not just to show the average price of Massachusetts General Hospital but that even within the same hospital, there is wide variation across different payors.
Q. Uh-huh. And you know about that wide variation, right? I mean, you -- you have data that demonstrates it?
A. Correct.
Q. So is it fair to say that that variation is knowable?
MR. STOY: Object to the form.
THE WITNESS: Some of the variation's knowable. With respect to this class, it's likely that we might not know as researchers or as, you know, using publicly available data, what the relevant price would be for the members of the class.
BY MR. MIGLIACCIO:
Q. You're talking about the proposed class here in this case?

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A. Correct.
Q. And you know -- I mean, you know, you understand that this class has not been finally certified yet, right?
A. Correct.
Q. So there -- it's not -- you know, there's -- there is not yet a defined class and the definition could potentially be different than the way it is presently, correct?
A. Correct.
The reason I answered the question that way is because what we know about Massachusetts General Hospital -- first of all, this is a recent development within the year that we required hospitals to be more transparent about their prices. There is still uncertainty about whether there's full transparency about the prices and furthermore, we only know prices in the hospital setting. We don't know prices in the outpatient setting. So there is still big gaps in what we know.
Q. Tell me about this recent development that just happened with respect to -- that you just referenced.
A. I believe that in the last year or so the government mandated hospitals to be more transparent

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with their prices and the reason it did that was because it was well known that there was a lot of intransparency in what prices would be if a patient kind of walked into the emergency department at Massachusetts General and got a procedure, there could be tenfold, maybe even a hundredfold difference in kind of prices depending on where they went and what provider -- what insurer they had.
There was just huge amount of intransparency and uncertainty from patients' perspectives. The government decided to make that a priority and it started with hospitals, for hospitals to make prices more transparent.
Q. This was legislation, right, like federal legislation?
A. I don't know if it's legislation or an executive order.
Q. Okay. And are you talking about -- I mean, I've heard of something called surprise billing. Is that related to -- to what you're talking about now?
A. It's potentially -- it's related. It's not exactly the same. Surprise billing is another whole level of complexity where somebody can go to the hospital and they could be in network for

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certain services but out of network for other services because the hospital might employ different people and they might not know what prices they're going to get.
So I think surprise billing is specifically about the question about whether they're in -- whether they're in network or out of network, and there could be huge differences in prices faced that are unexpected by patients as a result of that.
Q. Got it. Got it.
So you think that the government -- that -- that the government has started with hospitals as -- as -- as a first priority, but it may not have moved to outpatient procedures yet?
A. It has not. It has not moved to outpatient procedures.
Q. It has not.
And do you know when of if it will move to outpatient procedures?
A. I don't. It's -- I was -- we, you know, I don't think most people saw that the Trump Administration would make price transparency a priority and now we might have other priorities and it's unclear.

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They've been intransparent for decades. They suddenly became transparent in this one kind of sector of the healthcare industry. Who knows what's going to happen in the future.
Q. When did this happen, like when did the -- just January 1 of this year?
A. Within the year, within 2020 -- or actually, 2021. I'm not -- I would have to review the dates of this.
Q. Sure.
And -- and you think it was an executive order that did it?
A. It -- it could have been an executive order.
Q. Okay.
A. I'm not sure.
Q. Got it.
Yeah, I -- I won't hold you to it. We could look at it and figure it out exactly if necessary.
A. Yes.
Q. How does that change or -- your analysis in your report or does it because since this sector now has great -- great transparency?
MR. STOY: Object to the form.

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THE WITNESS: I -- I don't know if I'd characterize it as great transparency. Again, it's -- it's a part of the healthcare -- it's a -- it's a sub -- subset of providers that work in hospitals that are now required to disclose prices with various insurers. We don't know whether this information is accurate yet. It's only been out there for a little while.

There is a vast majority -- there's a lot of other places that patients get care, most of the time in outpatient settings, that we still don't know what those prices are.

BY MR. MIGLIACCIO:

Q. Are you doing any research into this, like is this part of your academic research?

A. This is not -- it's not currently a part of my research agenda. It's certainly within my scope of expertise, and I could become interested in it at some later point.

Q. Yeah. Has -- have the -- has the first dataset become available?

A. They are available on the -- on -- I believe they're -- they're required to make the datasets available. If you look at, for example, figure -- where I have like the prices at

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Massachusetts General --

Q. Uh-huh.

A. -- there is a note that tells you where to download those data.

Q. Uh-huh.

A. So Figure 8 is where you would look for MGH. And I would imagine that other hospitals have other sites where you could download their data.

Q. Got it.

So you got this from that -- from that database?

A. Correct.

Q. That's where this came from. Got it.

And had it relates to -- and so the -- the -- the CPT HCPS -- HP -- HCPCS code --

A. You can call it -- you can call it "hick-picks."

Q. "Hick-picks"? Did I say that right?

A. Yes.

Q. "Hick-picks." Got it. Okay. Thanks.

Those codes, so these would be procedures that were done inpatient; is that right?

A. These are procedures --

Q. Oh, outpatient. Outpatient. Sorry.

A. Right. They're outpatient but they're

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done by a hospital. So it's, for example, a clinic that is associated with MGH.

Q. Okay. So -- so I'm in Washington, D.C. And I'm just going to, you know, give you a -- like kind of an example of how it is here.

MedStar is a big hospital system in the Washington, D.C. area.

A. Uh-huh.

Q. And if you go to a physician -- as an outpatient, there are many physicians now, it seems to me, that are like the MedStar, you know, office of a certain specialty, but they're an outpatient clinic.

Does Massachusetts General have outpatient clinics that do things like urinalysis, colonoscopies, et cetera?

A. Yes.

Q. Okay. And they're like branded as Massachusetts General, you know, GI specialists? I'm giving a hypothetical, fictional example, but is that a realistic sort of thing?

A. That -- that possibility does -- does exist where --

Q. Okay.

A. -- there's a clinic that is I believe

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owned by MGH and submits claims under the Massachusetts General Hospital tax ID, there are examples of that.

Q. Okay. And so the pricing of all these clinics -- or of that particular hypothetical, fictional, potentially, you know, fictional clinic, would be transparent now in this matter?

MR. STOY: Object to the form to the extent it misstates his prior testimony. Objection. Incomplete hypothetical.

THE WITNESS: You want to restate your question? You had a lot of fictional, hypothetical in there.

BY MR. MIGLIACCIO:

Q. Sure.

I mean, so let's say there's an MGH outpatient clinic that does colonoscopies. The prices of those colonoscopies are now going to be known?

MR. STOY: Object to the form. Same objection.

THE WITNESS: It's unclear whether we actually do know the prices.

I also want to say that we -- I'm not sure if we know all of the -- you know, it's -- it's

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helpful to circle back to this class, and I believe the class are the patients here.

So we would be interested in what the patients would pay, not necessarily the price that the provider is getting. I don't know if we know all of the details of the insurance contract. I know that this price transparency, it could be limited to just the price that the provider is getting between the provider and the insurance company.

It does not give you information on cost sharing in this insurance contract between the patient and the -- and -- and the insurer. And as I just mentioned, we don't know the quality of this data yet. These data yet.

BY MR. MIGLIACCIO:

Q. But you've used it in your report, at least in Figure 8?

A. Yes. Because we can see that even if the quality was off, even if we didn't have the price exactly right, it does show quite a bit of variation. And that variation is illustrative. There's other sources of research out there even before this price transparency.

This, you know, within the last year that

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has demonstrated large variation in prices within insurer, within provider, kind of looking at the intersection between providers and insurers. It's a -- it's a -- it's a research finding as of five, six years ago that there is huge variation in price across different private insurers and private -- and providers.

Q. How -- do you know if there has been any research done to determine whether the price -- pricing data is -- is inaccurate?

MR. STOY: Object to the form.

THE WITNESS: This is something that people are currently looking at. I think it's still pretty new for us to know.

BY MR. MIGLIACCIO:

Q. It's required by federal law, right, and this is not something that's being done voluntary, I imagine?

A. That's right. This new -- at least what I just -- by it, what I just discussed about hospitals publishing data on prices for various procedures and various payors.

Q. I'm looking at footnote 207 of your report. Can you --

A. Okay.

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Q. It's on page 69.

A. Uh-huh.

Q. Is that the announcement of this -- this -- this new transparency requirement?

A. Possibly. Although this is a little bit earlier than I thought it would be.

Q. Okay. Yeah, that's why I was asking because I don't know.

A. It's possible.

Q. All right. Got it. Okay. I mean -- yeah.

Do you -- with respect to -- to the -- this issue that you just raised of pricing the -- the split between what the patient pays and what the insurer pays, do you understand that Dr. Song's report focuses on estimating total price, not just the patient's share of the price?

A. That was a little confusing to me, as I understood the complaint to be the -- to be the cost that the patient would bear, not total price. But I did notice that in Dr. Song's report he didn't delve into issues of cost sharing.

Q. So would -- would -- would it change your opinion now if you understood that he is only focusing on estimating the total price and not just

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the payment -- patient share of the price?

A. I understand what he's doing, but my understanding of the class is that we are interested in what patients would bear. So I was a bit confused. It seemed to me that that was an omission in the analysis that he did.

Q. Is it fair to say that the total price is the more appropriate measure for the burden borne by society for -- for testing?

MR. STOY: Object to the form.

THE WITNESS: I think that would be a much more complicated question. The burden borne by society. I don't think that total price is a good measure of that either because that includes profits by hospitals and like charges versus what they actually get after negotiations. There is just a lot of additional complexity there. I think burden borne to society would have to be better defined.

BY MR. MIGLIACCIO:

Q. All right. I'll give you some -- just some -- I'll set this up with some hypothetical questions for you.

Let's say there is a person at risk of developing cancer, you know, as a result of a medication contaminated with a carcinogen, right.

Let -- let's assume all those things are -- are true. There's somebody who took a -- you know, ingested a carcinogen and they are at a risk -- a higher risk of developing cancer.

Can -- do you follow that?

A. Yes.

Q. Okay. Who in society should bear the burden for screening that person for cancer risks?

MR. STOY: Objection. Incomplete hypothetical. Objection to the extent it calls for a legal conclusion.

You can go ahead.

THE WITNESS: Your question is who -- if there is a pill that somebody ingested that puts them at higher risk for cancer, who should be responsible for bearing that burden?

I don't think that's within the scope of my report. I don't know if that's within my expertise to say who should be responsible for that.

BY MR. MIGLIACCIO:

Q. As a healthcare economist, what -- does your research focus or include expertise on who should pay what in -- in the healthcare system?

MR. STOY: Object to the form.

THE WITNESS: No. By "should," do you

mean some normative sense of who bears responsibility, who should -- as an economist, I think that would take a lot of careful thinking. We might have the tools to consider that but I wouldn't have the tools to think about it right off the bat on this call.

We often -- it depends on contracts. It depends on the legal system. We use -- we are quite familiar with contracts and who does pay the burden and we might compare different contracting arrangements and compare which one is better in terms of welfare for society. But those would be complicated analyses that would take deeper thought.

BY MR. MIGLIACCIO:

Q. In the current regime we have in this country for healthcare -- for healthcare generally, who pays for healthcare for an -- an average person? Maybe that -- maybe that's too difficult for you -- you know, a hypothetical person, let's give it a hypothetical person.

MR. STOY: Object to the form.

THE WITNESS: Yeah.

MR. STOY: Objection. Incomplete hypothetical.

(Whereupon, a brief discussion off the

record.)

THE WITNESS: I was -- I was starting the shortest answer is that it's complicated. It depends on the person. It changes year to year depending on healthcare reform or not. There are just so many variables to consider here I don't think I could give you an answer that would fit within my seven hours probably.

BY MR. MIGLIACCIO:

Q. Yeah. Let me try to -- let me try to put some specificity around this and see if we can fit within the seven hours.

Medicare. Who -- who -- who's eligible in this country?

A. Broadly speaking, there are two types of people that are eligible for Medicare. People that are above 65 and people with some disability. There are also special populations such as people that have renal failure and get dialysis.

Q. Let's say somebody's over the age of 65, right, they're eligible for Medicare.

Who pays for Medicare for that person who is eligible for it?

A. There are several levels to this. Medicare is a government program so the government

runs -- the government funds Medicare through taxpayer dollars. There are -- again, I could give you a longer answer, but I think the shorter answer is that it's a government-run program that is funded by taxpayer dollars and administered by private contractors.

So who pays, it could be like any of those, it could be the taxpayers, it could be the government, or it could be the private contractors that administer Medicare in different jurisdictions.

Q. Where does the money ultimately come from?

MR. STOY: Object to the form.

BY MR. MIGLIACCIO:

Q. For that person's healthcare?

A. As I said, it -- you know, one way to trace it back is, you know, taxpayers fund the Medicare program.

Q. Yeah. Got it.

So if there is a person -- strike that.

I'll -- I'll ask it a different way.

Have you done any research into -- I think you were -- you had talked about the research you've done with diagnoses and trying -- and I don't want to misstate it. What was that research again?

A. It was research on the diagnostic process,

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the -- yeah, I think I would just succinctly sum it up as the research on the diagnostic process.
Q. And then that related to Afib, right, atrial fibrillation, or was that a different?
A. The guidelines research is related to atrial fibrillation.
Q. Got it.
What are the --
A. Go ahead.
Q. What -- what are the risks associated with some -- with -- with an individual or a patient population who does not get timely treatment for atrial fibrillation?
MR. STOY: Object to the form.
THE WITNESS: Your question was whether -- what are the risks for patients that don't get timely treatment for atrial fibrillation.
I think this is actually -- so I was going to say that my research on diagnoses is not necessarily the research on atrial fibrillation. The research on atrial fibrillation is my research on guidelines. Timeliness of diagnosis is not really an issue with atrial fibrillation.
Atrial fibrillation's a chronic condition. Most people have it, you know, by the time they're

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very old. And the question here is how you should treat atrial fibrillation, not whether you should diagnose it or how do you diagnose it.
BY MR. MIGLIACCIO:
Q. Got it.
The research you did on diagnoses, were those for any particular disease? Did they focus on anything specific?
A. The research is motivated very broadly. The paper where I dig into a specific clinical setting in depth is in the presentation of patients in the emergency department with potential pneumonia.
Q. And what was your conclusion there?
A. That there are real possibilities of Type I and Type II error in the diagnosis process. That there are questions about how many people we should diagnose or not.
But more importantly, there are questions about diagnostic accuracy. You could diagnose the same number of people but have a much higher accuracy in doing so. And that the diagnostic process is not just a simple test like a chest x-ray but it also involves human interpretation and involves a system of care that could be prone to

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error.
Q. Got it.
With respect to pricing, is it fair to say that industry and government agencies use averages for pricing certain things? I'll say, for instance, gasoline?
MR. STOY: Object to the form. Objection beyond -- to the extent it's beyond the scope.
THE WITNESS: Do you want to be more specific about how they use the averages?
BY MR. MIGLIACCIO:
Q. Well, even if there is variation in the real world, I mean, doesn't -- can't you determine the average price of gasoline?
A. I think the question is whether the average price of gasoline, in this case the average price of a service used in screening, is the relevant object.
Of course you can calculate an average but the question you should ask is whether it's the right average for the right patient population and whether it's the only thing that matters.
Obviously, we -- we measure standard deviation in variants in a lot of settings because we care about variation. So the question is not

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whether we can measure an average, but it's whether that average is the right measure for what we want to do.
Q. Uh-huh. You use averages in your own work; isn't that fair to say?
MR. STOY: Object to the form.
THE WITNESS: Again, the question is what average am I using. You know, if you're using an average in your research paper, you have to defend that that's the right average, that that's the average that we care about. And you -- if you're not, you should expect pushback from your peers about whether you're using the right average or not.
BY MR. MIGLIACCIO:
Q. Can you give me some examples of where you've used an average and where you've had pushback and where you've defended it?
MR. STOY: Object to the form. Objection. Beyond the scope of his report.
THE WITNESS: I can't remember the last time I personally got pushback, but I could imagine getting pushback if you are saying that you're interested in one patient population and you're giving the average for another patient population.

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BY MR. MIGLIACCIO:
Q. Got it.
So like two distinct patient populations. What would be an example of like one patient population and an average for a different one? Can you -- can you give me one?
A. Yes, I think in this case it would be the average -- if you're using the average price -- the private insurance price for some general patient population that isn't well defined and you're applying that to the patients that took at-issue valsartan. Those would be two different patient populations.
Q. I think you stated in your report that the -- when you looked at some of the data, that you saw the average age of a valsartan -- of somebody who took one of the valsartan-containing drugs was 63 years old.
Do you remember that?
A. Yes, I do. I would have to look...
Q. Yeah, I'll -- I see that.
MR. STOY: And, Nick, while he's looking --
MR. MIGLIACCIO: Yeah.
MR. STOY: -- we're coming up on noon

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Dr. Chan's time so just --
MR. MIGLIACCIO: Yeah.
MR. STOY: -- keep that in mind.
MR. MIGLIACCIO: Sure. Are you hungry, Dr. Chan, if you want to eat something, please just say the word because I was starving before and I don't want you --
THE WITNESS: I could -- I could certainly eat, yeah. I could definitely eat.
MR. MIGLIACCIO: Please do. We could take -- we could take a break.
THE WITNESS: Okay.
MR. MIGLIACCIO: Yeah.
THE WITNESS: You want to do 30 minutes?
MR. MIGLIACCIO: That's fine with me.
MR. STOY: Will that be okay with the overall time constraints, Nick?
MR. MIGLIACCIO: I think so. I -- I really -- I do. And I'm -- because I think even from now we have like five hours and I think --
MS. HILTON: Can we go off the record?
THE VIDEOGRAPHER: We're off the record at 11:56 a.m. Pacific time.
(Whereupon, a brief recess was taken.)
THE VIDEOGRAPHER: We are back on the

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record. The time is 12:36 p.m.
BY MR. MIGLIACCIO:
Q. All right. Dr. Chan, I want to ask you a few questions.
I want to go back to paragraph 42 briefly of your report. And you have -- I think you detail Figure 2 and discuss risk factors for specific populations.
A. Okay.
Q. I think I'm going to read the last sentence of paragraph 42 which states, "Even with these substantial relative risks, again, only age and smoking history are used to define the specific population recommended for colorectal and lung cancer screening."
Did you detail the relative risk of age for colorectal cancer in this paragraph?
A. Not in this in paragraph. It might be detailed somewhere else in the report, but I can't find it right now.
Q. Okay. All right.
Yeah, well I couldn't find it either so, you know, I -- if we have more time I might ask you to look and see or at least tell me where it can be found.

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A. Yeah.
Q. Because I did not see it myself.
But in the meantime, I will go back and ask you some other questions.
We were talking, I think, before the break about pricing of medical services and -- you know, I want to ask you about Dr. Song. If you would agree that he's qualified to offer the opinions that he has offered?
MR. STOY: Object to the form. Objection to the extent it calls for a legal conclusion with regard to qualifying Dr. Song as an expert.
THE WITNESS: Yeah, I'm not sure if I can qualify -- I'm qualified to assess whether he's qualified.
BY MR. MIGLIACCIO:
Q. Would you agree he's well respected in the field?
MR. STOY: Object to form.
THE WITNESS: I'm -- I'm not sure how to characterize that. I know him.
BY MR. MIGLIACCIO:
Q. Okay. Have you ever cited his work in any of your own publications?
A. I'm not sure if I have.

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Q. Would you agree that the publications that Dr. Song relied upon are well accepted and peer-reviewed in his report?
MR. STOY: Object to the form.
THE WITNESS: I'm not sure -- can you restate that again?
BY MR. MIGLIACCIO:
Q. Yeah.
Would you agree that the publications that Dr. Song relied upon in his report, and I know you've reviewed it for purposes of yours, would you agree that the publications that he relied upon are well accepted and peer-reviewed?
MR. STOY: Objection to form.
THE WITNESS: I don't remember going over his -- the sources that he relied upon in detail. And I'm not sure how I would characterize whether a publication is well accepted or not.
BY MR. MIGLIACCIO:
Q. What do you recall of the -- of the publications that Dr. Song relied upon?
A. I don't recall much. I would have to look at his report again to refresh my memory.
Q. Okay. I can -- I think we have that. Let's -- let's go get that. Bear with me. I can

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try to pull that up for you. I'm going to try to make this work on my end. So I won't -- I'll move on to something while -- while I'm trying to do that.
I'm going to ask you about some of -- of your own publications. And I think I -- we had discussed before the break that it's -- the average age of a valsartan user was 63 years old. I think we -- you -- that's what you detailed in your report, right?
A. Yeah, I would need to look at the relevant paragraph, but that sounds right, yep.
Q. Which paragraph was that?
A. I see something in paragraph 65. Is that what you're referring to or...
Q. I think that that is what I was referring to.
A. Okay.
Q. It looks to me that you -- that that data was based on data that you -- 63.3 years old, right? And this data was pulled in 2018; is that right?
A. Where do you see that it was pulled in 2018?
Q. I'm going to believe that is what I have. I'm going to try to find a citation for you. I seem

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to have lost it for the time being.
But would you agree with me that if -- that if the average age of a valsartan user is 63, and for us, and here, that the class concludes several years ago, in 2018, would you agree that this class, the proposed class that we have defined, the majority of the class would be -- would be on Medicare? Can you agree with that, if the age was -- is 63 years old, the average age?
MR. STOY: Objection. Form. Incomplete hypothetical.
THE WITNESS: I'm not sure if I can agree with that. I think we could probably look at that in more detail. But just based on these facts alone, I'm not sure if that necessarily leads to that conclusion.
BY MR. MIGLIACCIO:
Q. What data did you rely upon to determine that the average age of a valsartan user was 63.3 years old?
A. I believe what is cited in that sentence comes from another study.
Q. Okay.
A. In footnote number 87.
Q. Uh-huh.

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A. And I think that would be -- it might have been some summary statistics calculated in that study.
Q. Got it.
Do you know if that was a meta-analysis, that study?
A. It might have -- it likely drew from other previous studies.
Q. Got it. Got it.
I'm going to show you, if I can now, Dr. Song's report. And hopefully I'll be able to bring it into your folder here.
MR. MIGLIACCIO: This will be Exhibit 4.
(Whereupon, Chan Exhibit 4 was marked for identification.)
BY MR. MIGLIACCIO:
Q. Once I rename it.
A. Okay.
Q. You should have it now, hopefully.
A. Yes.
Q. Okay. So I had asked you about the publications that he uses and used in his -- in his -- in his report. I wanted to know if they were authoritative, well accepted or peer-reviewed, but I want -- you know, I know you've looked at this in

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detail and it's, you know, fairly lengthy but I wanted to ask you if anything here jumps out at you as -- as being none of those things, any of the sources he cites?

A. Are you asking me to refer to the materials relied upon for him?

Q. Right.

MR. STOY: I'm just going to put an objection on the record to -- I mean, there's over a hundred cites here, so...

THE WITNESS: Yeah, I'm not sure if I'll be able to look through this and pull out any sources that don't meet those criteria. There's certainly some of these that are not peer-reviewed.

And I'm not sure what you mean by authoritative and well accepted still. It's something could be very appropriate for one purpose but not very appropriate for the purposes that we require in this case.

We might have a -- an article that is very appropriate when it describes the ratio of prices between private insurance and Medicare for that audience but would not be appropriate if we're trying to apply it to this case. So what you mean by well accepted and authoritative is -- depends on

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what you're using it for.

BY MR. MIGLIACCIO:

Q. Okay. Let me restate my question.

A. Okay.

Q. You -- you -- you reviewed his report in detail, right, in -- before you offered your opinions?

A. I reviewed his report. I am not sure what you mean by "in detail." I have the hours that I reported in terms of how long I spent on reading his report.

Q. You did not in your report that -- the document that you've produced, you did not identify any publications that Dr. Song relied upon that, in your mind, were suspect, did you?

MR. STOY: Objection. Form.

THE WITNESS: Not specific sources that I thought were suspect.

BY MR. MIGLIACCIO:

Q. Okay.

A. But, again, some of these sources are fine for one purpose but not fine for the purposes that we need in this case and I think in my report I do describe those.

Q. Which sources, and can you point me to

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those specifically?

A. I'm not sure which paragraph I mentioned this. But I think it gets to the point of averages for a different patient population are not the averages that we want here. This has to do with needing to know how various quantities that we care about, such as prices or such as what services are going to be used, how they might correlate with patient characteristics in patients who might be in a class, and whether those data to come up with those averages even exists anywhere that anybody could use to calculate the relevant average.

Q. Can you direct me to that, to that portion of your report?

A. Sure. Let's see. Let me go back to my report. Now it's kind of hard -- which exhibit is it, is my report?

Q. Yeah, I'm sorry, I renamed them. I believe it's Exhibit 2.

A. 2. Okay. Let's see.

I think paragraph 100 speaks a little to this.

When you say something is correlated with something else, then you can't just calculate the average of that something else without knowing what

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you're conditioning on in the first place. So if something is correlated that means the average that you care about might change if you switch populations.

Q. And, again, you -- you -- you do know that this population has not been determined with finality, right?

A. Right. But I know that it would likely be different than the sources that Dr. Song is relying upon and I also think that it wouldn't be feasible even to measure that with the data that we have.

Q. Well, why do you think it would not be feasible?

A. Because the data have not been made public.

Q. Which data have not been made public?

A. Many of the pricing data have not been made public and how that correlates with individual characteristics of patients that would determine what services we need to recommend for the medical monitoring program. The cost sharing agreements in these contracts are not public. There are a number of different components to evaluating spending that would not be public.

Q. Isn't it fair to say, though, that, you

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know, the government knows how much it spends annually on -- on Medicare?
A. That, again, is an average.
Q. Uh-huh.
A. That's an overall -- that's an average for how much it's spending for the entire population of Medicare patients. So there's two problems with that. Number one, there could be patients in the class that are not Medicare patients. And number two, there are Medicare patients that aren't in our class.
Q. Right. I -- but the government nonetheless can determine how much it spends for the -- for the whole population, right? I mean, that -- that is --
A. Of patients --
Q. -- that is --
A. Of patients under Medicare. But, again, that's abstracting away from the possibility that we care about cost sharing, which I'm still not clear about if we're -- it depends on who -- you know, my understanding is that the class is any -- any payments that the patients would have to make for monitoring, not the payor.
So first, that's one issue. And then

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another --
Q. Where do you draw that -- I'm sorry, Doctor, to interrupt you.
But where do you draw that -- how -- how did you come across that assumption? Where -- where do you -- where do you draw that assumption from?
A. I think that would be -- I think I discussed this in my -- my assignment and my understanding of the complaint.
Q. Okay.
A. Let's see.
So in paragraph 8, it says, "The proposed medical monitoring class consists of individuals 'who consumed a sufficiently high Lifetime Cumulative Threshold of NDMA, NDEA, or other nitrosamine, in generic valsartan-containing drugs manufactured by or for Defendants.'"
So the -- the class are the individuals who consumed this. It's not named that the third-party payors are in that class. This is in contrast to the other class of economic loss where the third-party payors are included in that class.
And that's in paragraph 9.
Q. So that -- that is how you have reached that conclusion, that is how you -- you have that

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assumption, right?
A. That's my understanding of the complaint.
Q. Did anybody provide that understanding to you or did you just -- is that your understanding, sitting here with your own interpretation?
A. That's my understanding after having read the complaint and bringing this up with the attorneys involved in the case.
Q. And if you read the beginning portion of paragraph 8, "In regards to the proposed medical monitoring class, I further understand that, among the remedies requested, Plaintiffs seek" -- you know, quote -- "'seek injunctive and monetary relief, including creation of a fund to finance independent medical monitoring services.'"
Where do you -- or do you see within that language any implication with respect to cost sharing?
A. It just reads to -- it read to me that the class for medical monitoring were patients, and third-party payors were explicitly not included. They were not named in that class. And that is contrast with the second class of economic loss where third party payors are explicitly named.
Q. So that's the basis for your -- for that

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assumption and that conclusion?
A. Correct.
Q. And you're not -- not a lawyer, right?
A. No.
Q. Okay. And this -- this -- this assumption was also provided to you, or in part, by counsel; is that correct?
A. That is --
MR. STOY: Objection. Asked -- hang on.
Objection. Asked and answered. Objection. Form. To the extent it misstates what he previously testified to.
THE WITNESS: Correct. I previously said that I read the complaint.
MR. STOY: Go ahead.
THE WITNESS: This distinction, I noticed this distinction in the complaint, and I discussed -- I discussed this idea with the lawyers involved in this case.
BY MR. MIGLIACCIO:
Q. I see.
And is it fair to say that if you -- how many class action complaints have you read?
A. This is my first one.
Q. First one. Got it.

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Is it fair to say that if you -- if this assumption was incorrect with respect to cost sharing that it would alter your opinions in some fashion?

MR. STOY: Object to the form.

THE WITNESS: I don't know if you want to clarify what you mean by "alter in some fashion," but there are -- there's a section in my report on cost sharing.

BY MR. MIGLIACCIO:

Q. Uh-huh.

A. And that is under the assumption that we are interested in what patients are paying.

If we are not interested in what patients are paying and there is some other concept that is not well defined, it would need to be defined first, and it would likely -- it's possible that could lead to other variation that's unaccounted for.

Q. The question of variation of cost sharing, if cost sharing wasn't an issue, there would be no issue with respect to variation of cost sharing, right?

MR. STOY: Object to form. Incomplete hypothetical.

THE WITNESS: I guess what I'm saying is

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that we need to specify what is the object that we are interested in quantifying. Even if there is no cost sharing, there's a difference between charges and difference between charges and costs and ultimate amount that's reimbursed plus patient cost sharing.

There's many different kind of optics that we could be considering, and we would need to define that first. And some objects will entail other sources of variation.

BY MR. MIGLIACCIO:

Q. But cost sharing would no longer be a source of variation if we're not talking about cost sharing?

A. You're saying but cost sharing would no longer be of interest if we're not talking about cost sharing?

Q. No, would no longer be a source of variation if -- if -- if it's not at issue in this case?

MR. STOY: Objection. Incomplete hypothetical.

Go ahead.

THE WITNESS: If the assumption is that cost sharing is not at issue, then we would not

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consider variation in cost sharing.

BY MR. MIGLIACCIO:

Q. Got it.

Paragraph 117 in your report, you state that -- let me know when you are there.

A. I'm here.

Q. Yep. 117.

A. Yep.

Q. Yep. Okay.

A. Yes.

Q. I'm looking for where I -- you state in the middle, "Given the substantial price variation that I summarize above, there is no reason to believe that the average prices experienced by a proposed" -- "proposed class members is the same as the average prices experience" -- "experience by the nation as a whole."

I think you just said that earlier.

A. Yeah.

Q. Isn't it fair to say that you have not made an effort to determine the extent to which you say the average prices experienced by proposed class members is the same as the average prices experienced by the nation as a whole? You haven't tried to -- to determine that?

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A. In the report I do say how patients that take valsartan are different than patients who don't take valsartan. That is evidence in that direction.

But more broadly, in my report, I would say that it would be infeasible to determine the prices for patients in the class as -- for reasons I just told you, including the unavailability of data.

Q. Well, if we take the cost sharing out, which we'll -- we placed aside for these discussions, what other data do you contend is -- is unavailable?

A. Should we also define over what time span this is going to be for?

Q. What -- what time span a medical monitoring program will be for?

A. Right.

Q. Well, I think we can define it within a finite period of time. We could say one year for -- for purposes of our discussion.

A. So you --

Q. I'm -- I'm just -- I'm giving you a hypothetical to say could you determine that for -- for one year how much something would cost?

MR. STOY: So you're not -- you're not -- that's not a stipulation, huh, Nick?

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MR. MIGLIACCIO: No, that's a hypothetical. To aid in the calculations here.
THE WITNESS: So we're not looking into the future by very much. We're going to restrict patients only to those who have Medicare.
BY MR. MIGLIACCIO:
Q. Uh-huh.
A. And we know exactly whether screening is appropriate for every single patient individually, then we could calculate the prices for patients in Medicare for this year.
Q. Got it.
Have you made any effort -- you know, since you -- you don't believe that the -- the prices experienced by class members are the same as the prices experienced nationwide, what efforts have you made to determine how far off you believe them to be?
A. I think this is supported by a few analyses in the report. So it's supported by the fact that patients who take valsartan are different than patients who don't take valsartan. It's supported by the variation in price among patients seeing the same provider, MGH.
It's supported by also variation in price

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that I -- that I show in other -- other exhibits like figures -- Figure 9, "OptumHealth commercial pricing," variation for the proposed procedures.
So if there's variation -- if there's no variation then you would be much more confident that the averages shouldn't differ between groups of patients. But if there's a lot of variation, that tells you that there's a lot of scope for averages for one population differing from averages for another population. And that, I think, is enough evidence to show that you could be wildly off.
Q. When you say "wildly off," like, can you ballpark that percentage?
A. Yeah, I mean, I think that's what some of these figures do. You could be off by a factor of like 400 percent if -- especially if the class is not a big class.
If the class is a subset of patients who took at-issue valsartan, it's a small population relative to the entire population. And therefore, you could be -- you could be in the 5th percentile or in the 95th percentile and the difference between the 5th and the 95th percentile for one given provider is 400 percent.
Q. How do you define like a -- "not a big

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class"?
A. So, for example, 5th percentile means 5 percent of the population is -- is, you know, at the 5th percentile or below. Or 95th percentile is 5 percent of the population is at or above this price.
So if you have a class that's 5 percent of the population you could be as unlucky to get something that's 400 percent off if you compare the 5th to the 95th percentile.
Q. When we're talking about the size of the class, how do you mean in terms of a small class, a big class, what do you mean by that?
A. So -- so kind of implicit in my previous answer is you would ask how many people are in this class and how many people are in the overall population of the nation. That's one way of asking that.
Or if you are -- even if under the assumption that all members of the class -- you were able to measure prices for some bigger sub -- bigger set of people that include everybody in this set, included people in the class, which I don't think is true, you could use that bigger population.
So in our previous example where we're

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only talking about the Medicare patients, we would look at Medicare patients and we'd ask how big is Medicare patients relative to the size of our class.
Q. And what are your -- do you have assumptions with respect to the size of the class here?
A. No.
Q. You have no assumptions?
A. No.
Q. Okay.
A. I mean, I -- I -- I have some intuition that it's not going to be 50 percent of the U.S. population.
Q. But no assumption on -- on -- on the size, the number, the -- the -- you know, how many people other than that intuition?
A. I haven't -- yeah, I haven't -- no.
Q. Have you asked for that information?
A. I so far have not asked for that information, but I think that would be relevant for moving forward. I wouldn't -- you know, I would reserve the right to look at that in the future.
Q. Got it.
So for calculating the prices as we just went through that hypothetical, in a limited

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fashion, that we -- that we could calculate the prices for -- for patients in Medicare for a year, could you calculate that for two years?
A. So I say in my report the farther into the future that you get, the more uncertain this is going to be.
Q. Yeah.
A. It's going to be more uncertain for private insurance than for Medicare, but even within Medicare, the Medicare budget changes every year, the conversion factor between RVUs and dollars could change and does change every year.
The geographic price indices between different regions in the country, that changes. It could change quite drastically. For example, Alaska doubled in one year.
So the farther that you move out, even within Medicare, there would be more uncertainty on prices alone.
But I think the bigger point, this might not be -- this is kind of a combination of both Kaplan and Song, is that we can't evaluate the overall spending for a medical monitoring program only by asking about prices. We have to ask what are the services that are going to be rendered and

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this -- there's a lot of uncertainty about what those services would be the farther we move out.
Q. So how would -- you know, would it be possible to do two years if you knew what the services are or the menu of service?
A. I said it's -- it's possible, but it becomes more uncertain.
Q. Okay.
A. Moving from one year to two years.
Q. How about three years?
A. More uncertain then.
Q. Okay. So your work in the NBER, do you ever work on budgeting, working in the NBER?
A. The government budget?
Q. Or -- or have you ever dealt with budgeting issues working in that capacity, in -- in that --
A. Can you clarify what you mean by "budgeting issues"?
Q. Where the government, the federal government seeks to budget things out into the future, right, isn't that typically how the federal government works, they have a budget and it -- they have amounts that -- that are -- that are set into the future?

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MR. STOY: Object to the form.
THE WITNESS: I'm familiar somewhat with how the budget for Medicare has been set.
BY MR. MIGLIACCIO:
Q. What -- what is your familiarity with that?
A. So there is some budgeting into the future but this could be changed by Congress any given year.
Q. Uh-huh. How -- tell me, how is it -- what is your familiarity of how -- how does Medicare get budgeted into the future?
A. It's very complicated. I know that a lot of it has to do with politics. I know that one example of this is called a "doc fix" where in order to have a balanced budget there was some promise to eventually lower prices on medical spending for physician services but every year or every couple of years there'd be a delaying of this.
So I think there is quite a bit of political influence on what the Medicare budget is. It's not some formula that gets set by something that's free of politics and is kind of -- you know, is -- is let to run in some predetermined fashion.
Q. How far out does the Medicare budget get

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set; do you know?
A. I think in -- as I said, in practice, it could change in a year.
Q. Uh-huh.
A. So by definition it's not in practice set in stone.
Q. And is it determined annually, on an annual basis?
A. I think it could change at any point.
Q. The government knows how much it spends on Medicare for a given year, right?
MR. STOY: Objection. Asked and answered.
THE WITNESS: For -- for a given year, I believe the government could track down how much it spent on Medicare.
BY MR. MIGLIACCIO:
Q. Do you believe -- you know, is it your opinion that for one price to be representative of another, they would need to be the same?
A. Say that again.
Q. Is it your opinion that for one price to be representative of another, they would need to be the same?
A. For one price to be representative of another price, the two prices would have to be the

same?
Q. Yes. That -- that's what I'm asking you.
A. I'm not sure what I -- I'm not -- I'm not sure I understand that question. Sorry.
Q. So if you were to -- if you were to attempt to estimate the prices for a -- a patient population, would you -- you would look at representative prices, right; is that something that you would do?
MR. STOY: Objection. Incomplete hypothetical.
THE WITNESS: What do you mean by "representative prices"?
BY MR. MIGLIACCIO:
Q. You would look at average prices?
A. Average prices. I'm not sure -- yeah, I'm not sure I understand, like -- ultimately, what we want to do is to be able to quantify total spending. I'm not sure what we mean by "average prices."
Like, is there some weighting to the prices? The average prices alone don't -- some unweighted version of average prices is not going to tell you how much we are going to spend in a medical monitoring program.
Q. I'm going to direct you to paragraph 117.

You can tell me when you are there.
A. Yes.
Q. Yeah. I mean, you discuss Dr. Song's proposed estimates.
A. Uh-huh.
Q. Based on national averages and -- and you say, "not average prices specific to members of the proposed class."
A. Uh-huh.
Q. And you say, "Given the substantial price variation that I summarize above, there is no reason to believe that the average price" -- "prices experienced by proposed class members is the same as the average prices experience by the nation as a whole."
A. Uh-huh.
Q. So my question to you is, that given that you don't believe the prices experienced by class members are the same as the prices --
A. Uh-huh.
Q. -- experienced nationwide, what efforts have you made to determine how far off they are, like how far off do they vary?
A. I think as I said before, the analyses that show that the class members -- or people that

take valsartan are different than people who don't take valsartan and that prices vary in several of the analyses that I do within Optum or within MGH suggests that they could vary quite a bit.
Q. They could. But -- but have you determined that they do?
A. I think my level of certainty is quite high that they do vary. I haven't seen any evidence to suggest that they would be the same.
Q. So how much do they vary?
A. In order to -- in order to do this you would have to first specify the class, right?
Q. Right. And the class has not yet been determined.
A. Right.
Q. Class hasn't been certified. So have you --
A. But I can tell you that --
MR. STOY: Hang on, Dr. Chan. I don't think there was a question pending.
BY MR. MIGLIACCIO:
Q. So have you determined, then, how much they vary here?
MR. STOY: Objection. Asked and answered.
THE WITNESS: If there's no class, then I

wouldn't be able to -- and I think this is part of the problem of -- of defining a class. First you would need to know who -- you would need to define the class in order to ask whether it's feasible to -- the class would of course have to be captured by either a -- fully captured by Medicare data or fully captured by sources of data that are publicly available in order for you to ask how would the prices differ for members of the class versus other -- other patients.
What we can do is that we know that patients who take valsartan are different than patients who don't take valsartan. That's a starting point. That would suggest that these patients are -- there's no reason why you would think that -- so patients who take valsartan have, you know, hypertension. They have heart failure.
And those by construction, like the fact that they take valsartan implies certain medical conditions that other patients don't have. You would expect that patients that have certain medical conditions to have different forms of insurance.
And if you have different forms of insurance, you would expect that the prices should be different for those patients than for patients

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who don't take valsartan.
BY MR. MIGLIACCIO:
Q. If we disregard the cost sharing, right, that -- that -- that different forms of insurance issue falls away, right?
A. No. If you are saying, you know, some patients might be more likely to be covered under the VA or some patients might be more likely to have private insurance, again it all depends on what object you really want to focus on.
Even if you disregard cost sharing and you say it's the object of how much the insurance company pays providers, which I'm not sure is what -- it hasn't been specified exactly what the object should be, but if that is the object, that would depend on whether the patient has private insurance or Medicare or is a patient at the VA.
Q. But, again -- and -- and I -- I mean, I think you've answered this, but I want to make sure that I understand it.
You have not made any effort to determine whether prices experienced -- whether the prices for class members would vary by a certain percentage from the national average prices?
A. I just don't have the --

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MR. STOY: Objection.
Hang on.
Objection. Asked and answered.
Go ahead.
THE WITNESS: I don't have the data to do that. You can -- you can demonstrate that patients who take valsartan are different than patients who don't, but I don't have all of their private insurance prices that they are facing, like -- and I don't think anybody has those data.
BY MR. MIGLIACCIO:
Q. So -- so you -- you don't have an answer, then. You don't -- you -- you have not reached the --
A. Yeah. And I think it's an opinion that it's not really answerable unless you have much more detailed data sources than are publicly available.
Q. Would you agree that Medicare prices are available by geography at the state and local level?
A. Medicare prices are available, yes, Medicare prices are available if you know the provider type and if you know the geography and if you know the service.
Q. Do you -- do you think that the national average prices are useful in your analysis? Do you

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think there's -- I mean, you point to them. Do you think there's some -- are -- are they useful for -- for your -- for your opinion?
A. I don't think they would -- they're enough for us to estimate how much paying for medical monitoring would be for this class.
Q. But you used them to argue that -- or to opine, rather, that -- that it -- that it can't be estimated; is that right?
A. In some of the stuff that you've read from my report, I say that the national average price is different from -- for the -- different than the price that would be applicable for members of the class.
Q. And -- and you -- you don't have that delta, you don't have that difference?
A. I don't think anybody has that. And I don't think it would be feasible to calculate it because you can't calculate the price.
Q. Is it fair to say that you can get much more locally accurate commercial-to-Medicare price ratios by using data that show local variations in these ratios?
MR. STOY: Object to form.
THE WITNESS: Can you restate that

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question?
BY MR. MIGLIACCIO:
Q. Yeah.
Can you get much more locally accurate commercial-to-Medicare price ratios by using data that shows local variations in these ratios?
MR. STOY: Object to form.
THE WITNESS: I think my point is that you actually don't observe the real ratios for many -- for -- in many settings and for many providers, for many insurers.
We have, like, limited -- we have limited data. For example, Optum is from a specific class of insurers. We have hospital prices for certain insurers. But we don't have the data relevant that we would need for the prices of this medical class. So we wouldn't be able to calculate the ratios.
BY MR. MIGLIACCIO:
Q. This is a general question as to whether you can get more locally accurate commercial-to-Medicare price ratios by using data that shows local variation in these ratios?
A. Do the data exist? Is it available?
Q. Would you agree to that, yes?
A. I don't think the data are available.

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Q. You don't think -- you don't think that there is data that allows you to get much more locally accurate commercial-to-Medicare price ratios, you don't think it exists?
A. I think we could get data that are more locally accurate than the data that Dr. Song relies upon. But I don't think we have data available to get us what would be the relevant spending for a medical monitoring program for this class that has not yet been specified.
Q. Tell me about the more accurate local data. Where does that data exist? Where can you get it?
A. That is quite hypothetical.
I -- you know, I think -- what Dr. Song relies upon is -- or at least in his report, is a -- to my understanding, it's a paper that measures private insurance prices for some population of patients that's aggregated and compares that with Medicare prices. So certainly you could do better than that.
There are data on private insurance prices that are incomplete. So, you know, they're incomplete. They -- they -- they leave out populations of patients. They're only in certain

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settings.
They may or may not have geographic identifiers. And if you have geographic identifiers, then you could come up with something that is more, in your words, local to a geography. But geography is not the only variation that we need to account for.
Q. When you say certainly you can do better than that, what -- in your last answer, what do you mean by that and how much better could you do?
A. What I mean is that in Dr. Song's methodology he's using a ratio from a paper that is not published for this purpose. It's some average ratio in some population of patients that is almost certainly different than the population of patients that we care about in this class. And it's a single ratio.
And if you wanted to get more granular, you could look at different locations, if there are geographic identifiers. And that's what I mean by you could do better. If you wanted to have something that accounted for geographic variation in the ratios, you could use local prices from -- and private insurance, but those prices would omit, you know, classes of patients that I just mentioned and

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so they wouldn't -- there would be shortcomings there.
So -- so there -- there are different dimensions in which prices vary. Geography is one of them. And there are others that you might actually be worse. If you're focusing on, say, Optum data, Optum data are only from a certain class of private insurers. So you might do worse if you focus only on Optum data.
Q. What would those shortcomings be? Could you quantify how big they would be? How big -- how big would we be from the truth? Like, how far off?
A. I can tell you that there's big variation. If there's big variation that the potential shortcomings could be as large as the variation.
Q. Do you know how -- have you quantified how large the variation could be?
A. It's possible that the variation could be as large as 400 percent.
Q. What is the basis for that opinion?
A. The basis of that opinion is that there's variation between the 5th and the 95th percentile in prices that is as large as 400 percent and if you have a class that is the size that's small enough, say, 5 percent of the population, then you could

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have very unfortunate variation where it's -- you get your 400 percent off.
Q. Isn't it fair to say that most people reside in the center of the histogram and not at the tail ends, at the 5 percent or the 95th percentile?
A. It depends on the population.
MR. STOY: I was going to object to the form.
THE WITNESS: It depends on the population. If you say do most doctors reside in the center of the overall U.S. population in terms of income, the answer would be no. Most doctors reside in the top 5 percent.
BY MR. MIGLIACCIO:
Q. Right. And I'm not asking about income but I -- you know, I appreciate that.
I'm asking about, you know, healthcare spending or healthcare prices that people -- that would be paid for a person.
A. I think healthcare spending exhibits some of the same properties as income. So there are big kind of skewed -- they're -- they are not normally distributed actually, the healthcare spending. They're obviously all positives so they're not normally distributed. They could be log-normally

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distributed. So there is a possibility that you have skewed distributions and you could have outliers.

This is well known, that certain regions in the U.S. spend way more than others. There are -- there are -- for example, McAllen, Texas, versus San Antonio, Texas. So there could be -- you could actually have a small population that is in the tails of the distribution. The tails can be quite large.

Q. Do you have any reason to believe that people who ingested contaminated valsartan are not in the middle of the population?

A. I don't have any reason to believe that they are in the middle of the population because by definition they have -- you know, first of all, we would have to look at where -- who's in the class.

I mean -- so if you just say people who take valsartan versus people who don't take valsartan, that's a little bit easier and then you could say are they similar to the average population. I think probably not. They have heart failure. They have hypertension.

Are they similar to some population maybe, like you would have to work on specifying that

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population, but it's not clear to me how you would specify that population that they're similar to.

Q. And -- but you have not done this analysis to determine where a population of people who consumed valsartan-containing drugs, contaminated valsartan, where they would fall, right?

A. Again, I'm not sure if it's feasible to do this analysis if you want to account for private insurance prices and so forth.

Q. But to answer my question, you haven't done it?

A. I have done an analysis to show how patients who take valsartan are different than patients who don't take valsartan.

I haven't done an analysis to show what would the average price be for patients who take valsartan compared to patients who don't take valsartan, but I don't think an analysis could be done if you want to account for private insurance prices.

Q. Fair to say that you would have a reason to assume that a -- that -- that our proposed class would be in the middle because that's where most people are, right? Most people -- isn't that -- isn't there the -- most people do just fall into the

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center of the histogram chart --

A. It depends on --

Q. -- even though --

A. It depends on the population you're talking about. If you're comparing two populations, there's no guarantee that the most -- by -- it depends on the distribution. It depends on whether you're talking about one or two populations. In this case, we're talking about two populations.

So you're asking whether most people in one population falls in the center of another population. There's no reason to believe that.

Q. But there's also no reason to believe they reside in the tail ends, right?

A. I think there's something that distinguishes the population that takes valsartan. They have heart failure. They have hypertension. There is something that distinguishes them. And I -- I don't know if most of the population has heart failure. Probably most of the population doesn't have heart failure.

Q. Does not. So you're saying --

A. Does not.

Q. -- you have -- you don't think -- but do you -- do you think the majority of the population

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that takes valsartan has heart failure?

A. I would need to look further into that.

Q. You're not offering that opinion here?

A. I'm not offering that opinion. I'm just offering the opinion that there are obvious differences between people that take valsartan and people who don't.

Some of this is in my report that describes the characteristics of people who take valsartan versus people who don't take valsartan.

Q. How would heart failure impact Medicare costs for -- for the screening services that Dr. Kaplan has detailed in his report?

A. Right. So as I mentioned in my report, heart failure or just medical comorbidities would impact whether somebody is a candidate for screening or whether somebody has preferences that would make screening make sense.

Heart failure is a disease for whom most adults have a relatively limited life expectancy if they have it. And given that, that would impact the decision for whether somebody should be screened for cancer.

Q. So it would impact -- and your opinion is it impacts the decision of whether screening would

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need to be done, but it doesn't impact the price, the cost for a fixed service, right?
A. Oh, I see. For your -- your price --
Q. Yeah.
A. Your question's about price?
Q. Correct.
A. If you have heart failure, that could certainly -- and you don't have Medicare, that could certainly impact the type of insurance that you have. If you're a sick patient with heart failure versus a healthy patient without heart failure, and you're choosing between private insurance plans, you would pick a different insurance plan if you have heart failure, likely.
Q. Assuming the person is on Medicare?
A. Assuming the person is not on Medicare.
Q. That's your assumption, the person is not on Medicare?
A. Correct.
Q. Got it.
But I mean, as we looked at, the average age for a valsartan -- somebody who takes valsartan was 63, right, that was with that -- that 63.3, and the age of Medicare is 65, right?
A. Right. The -- the age --

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Q. Eligibility.
A. -- of Medicare eligibility is 65. If the average age is -- again, I think you asked this question before.
If I know the average age is 63, can I say that the majority of patients on valsartan is on Medicare? And I think I said that I wouldn't be able to automatically reach that conclusion. It could be -- because you would need to know the entire distribution.
Like, for example, if the distribution is a normal distribution, and half the people are above 63 and half the people are below 63, you could have close to half of the people not being on Medicare. It all depends on the shape of the distribution, not just the average of the distribution.
Q. If -- if you take away the cost sharing issue that we talked about at some length, right, the fact that somebody may have heart failure or a comorbidity shouldn't impact the cost for a fixed service, right?
MR. STOY: Object to the form.
THE WITNESS: For -- I --
BY MR. MIGLIACCIO:
Q. For a screening service. I'm sorry to

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interrupt you.
A. I think what I was saying earlier is that patients may choose different insurance plans and different insurance plans may have different prices.
Q. And you -- have you done that analysis here to determine what that -- what that differential might be?
A. For MGH in particular, I show that the differential could be quite a bit.
Q. Have you done it for any other hospital system?
A. No, but I think MGH is quite illustrative.
Q. I want to show you some of your -- I think some of your papers.
MR. STOY: Hey, Nick, would this --
MR. MIGLIACCIO: Yeah.
MR. STOY: Would this be a good time to take ten?
MR. MIGLIACCIO: Sure. Yeah, we can do that.
THE VIDEOGRAPHER: Okay. We're off the record. The time is 1:41 p.m. Pacific time.
(Whereupon, a brief recess was taken.)
THE VIDEOGRAPHER: We are back on the record. The time is 1:57 p.m. Pacific time.

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BY MR. MIGLIACCIO:
Q. All right. Dr. Chan, I want to ask you a few questions about some of your own academic publications. And I'm going to move into the exhibit -- the file of paper that you have submitted to the New England Journal of Medicine.
Here we go. I can do it. All right. I thought I got -- was getting the hang of this. Okay.
MR. MIGLIACCIO: It will be Exhibit 5.
(Whereupon, Chan Exhibit 5 was marked for identification.)
MR. MIGLIACCIO: And it is a New England Journal of Medicine document.
Q. Let me know when you have a chance to see it.
A. It's open.
Q. Okay. Great.
So is it -- is it fair to say that you have asserted in your own work the importance of a common methodology when it comes to the pricing of medical services?
MR. STOY: Object to the form.
THE WITNESS: Is there a -- a part of this article you'd like to draw my attention to?

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BY MR. MIGLIACCIO:
Q. I'm asking you generally. I mean, it's -- it's a nine-page article. I'll ask you some specifics, but I -- that's a general question.
A. Can you ask that again?
Q. Sure.
Is it fair to say that you have asserted in your own work the importance of a common methodology when it comes to the pricing of medical services?
MR. STOY: Object to the form.
THE WITNESS: I'm not sure. I...
BY MR. MIGLIACCIO:
Q. In this paper, you discuss using median -- median time values in defining benchmarks versus mean values.
Do you see that in the Discussion section?
A. Uh-huh.
Q. Then you go on to say that you use medians as an alternative, right?
A. Uh-huh.
Q. And you write "average" or "on average" roughly nine times in -- in this study, right?
I mean, you can look for it.
A. Right, yep, 9 percent. Is that right?

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Q. No. I said you used the word "average" --
A. Oh.
Q. -- throughout and -- throughout the --
A. Oh, okay.
Q. -- paper.
A. Yeah. I think -- yeah, go ahead. Sorry.
Q. Yeah. And I do see that you -- that -- that 9 percent, is that the average that you -- you've reached ultimately?
A. No, actually, that paragraph is an example where...
Q. I'm sorry, were you finishing --
A. No, I'm -- I'm reading it.
Q. Okay.
A. Sorry.
Q. Please, no, go ahead. I didn't mean to -- don't mean to interrupt your reading.
A. Yeah, I think that discussion is just saying that there are different ways of -- different moments in a distribution to consider. Mean is one, or average. And the other one is median. And they just tell you different things.
Q. Would you say this emphasis of averaging, the importance of averaging across data points, is it -- is it important in your research? Do you do

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it a lot?
A. I think this is similar to our previous discussion about the use of averages in research. It -- it's important to use the right averages.
In this case, you know, this is not a paper just comparing one average with another average. It's a paper that is comparing the average for a given procedure in a survey with an average in a nationally representative data source that -- or -- sorry.
It's -- it's an average in a data source that measures the time of how long this surgery takes, called NSQIP, and we are asking whether these two averages match up. And this is actually a research finding. It's not -- it's not -- we're actually asking whether the two averages for a given procedure match up. It's not -- it's not predetermined that they would match up.
So it's -- it's kind of like -- it's a -- it's a -- it's a research inquiry to ask whether using this average is representative of another average. And in this case, these two measures do closely follow each other, but it's not a foregone conclusion that they would.
Q. But it's fair to say that, you know,

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whether -- whether it was right or wrong, right, whether -- whether the -- whether they matched or they didn't, it's a common methodology to average, right? You used a common methodology, a methodology of averaging to determine if they -- if they would match the national average, right?
MR. STOY: Object to the form.
THE WITNESS: I don't know what you mean by common method -- I mean, I don't...
BY MR. MIGLIACCIO:
Q. You used the methodology of averaging, right?
A. Not really. I don't think that's what we're doing here.
Q. I thought you just told me that you were determining -- you were looking at something national versus another dataset --
A. Uh-huh.
Q. -- and to see if -- if they matched on average?
A. We were asking whether average times for a given procedure matched average survey responses. This is a research question. It's not a common methodology per se. I'm not sure what you mean by "common methodology."

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Q. Well, you used -- I mean, you -- you did these calculations to see if -- if -- if they would match, right, that's what you did?
A. That's maybe in one exhibit in this -- okay. There are several exhibits in this -- in this paper.
Exhibit 1, Figure 1, asks whether -- this is kind of -- it's kind of most directly related to what you're saying, which is the -- whether the average time that we observe in one dataset matches the average survey in another -- a survey response for the time in another dataset.
Now, Figure 2 is doing something very different, which is asking about discrepancy. That's, you know -- and discrepancy that kind of changes over time. So that's not just comparing averages.
Figure 3 is asking about the implications of discrepancy on different surgical specialties such as orthopedic surgery, urology, general surgery, showing that these implications can be large in terms of dollar terms.
For example, orthopedic surgery is paid more than $150 million more than what it would get if they had resorted to another measure. And

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cardiothoracic surgery is paid about $125 million less than it would have been paid if it kind of used another measure.
And then Figure 4 is asking whether discrepancies are kind of resolved with re-evaluation. So it's focusing on the discrepancies.
So I don't think this paper, overall, is only about comparing averages. It's about -- it's much more.
Q. Got it. I understand.
So -- and I appreciate that clarification.
But for -- for Figure 1, who did the averaging work? Was that something that you did or your team did in -- in gathering -- in gathering the dataset and averaging it?
A. I don't know if I would characterize Figure 1 as like a dataset of just doing averaging work. It's -- this work overall was done by me and my research team. Some of them are coauthors on this paper. Others are research assistants.
Q. What was -- what did you do beyond just averaging it?
A. I would say that's just the first step. We need a dataset with -- we chose these averages

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for this one particular exercise. But as I said, we also could do it in terms of medians instead of averages.
Q. Uh-huh.
A. And in this exercise, it was a regression. So after you have each individual observation, which is a procedure, a surgical procedure is one observation -- or a surgical procedure at a given point in time is one observation. We have many observations of these. Then we run a regression that kind of fits a line on these points here.
Q. When you say you could also use the median, what did you do with respect to the median?
A. So instead of using an average time from the NSQIP data we could use the median time. That's just a different moment in the distribution.
Q. Uh-huh.
A. And so when we do that, I mention discussion that we get a different result if we use the median instead of the average.
Q. Got it.
What was -- what's the difference?
A. It's a 9 percent difference in this case.
Q. Between the average and the median?
A. Uh-huh.

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Q. Got it. Okay.
Who did that work in determining the median information, was that you or --
A. The same research team.
Q. Got it. Got it.
And that's a methodology that you -- that you use frequently determining medians?
A. Often. Oftentimes the median is a better measure. If the distribution is skewed, you might want to use the median instead of the average.
Q. Got it.
Are there other measures other than median and average that you use --
A. Yes.
Q. -- in analyzing datasets?
A. Quantiles, like I -- like I mentioned in the -- like I use in the report, there's like 95th percentile, 5th percentile. There's a -- they're -- those are called quantiles.
Q. Quantiles.
A. And sometimes you kind of work with logs, like log -- logarithmic transformation. So you might take a mean of the log instead of a -- just the mean. So you first take a log, logarithm, of the value, then you take the mean.

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Q. And you use that methodology as well in your work as an economist, as a healthcare economist?
A. Yeah, I'm not sure if I'd call it a methodology. They're just different kind of ways to -- ways to characterize distributions.
Obviously, the most comprehensive way is just to show the entire distribution but you might focus on various moments of the distribution. You can focus on quantiles and medians, on averages. You might transform the distribution by first applying a logarithm to it, then taking an average. And that's quite different than just taking the average of the underlying distribution.
So there are various kind of transformations of the underlying data and there are different ways to characterize a distribution.
Q. When you -- if you were to do that, what -- what would -- what does it do to take the -- I think you said take a -- first apply a logarithm to it and then take an average?
A. Uh-huh.
Q. What -- what -- can you explain that a little bit more?
A. Many distributions are skewed. For

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example, income or spending, medical spending. So it would be quite fragile if you were to actually take an average of the underlying distribution of spending and it would be much more robust if you took a logarithm.
What a logarithm does is it transforms a variable that ranges from just above zero to a very large number, to something that's much more well behaved and symmetric -- potentially around zero, so it transform -- it might transform something to a more normal distribution.
And that's kind of -- earlier in my deposition I mentioned something called a log-normal distribution.
Q. Uh-huh.
A. That is something that only starts looking like a normal distribution when you take a logarithm.
Q. Got it.
You used -- and used that methodology, too, in -- in -- when you create averages?
A. Yeah, again, I'm not sure if I would call it methodology. It's just a way of transforming -- it's -- it's a very basic mathematical operation to transform data into something that more -- is more

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reliable.
Q. Uh-huh. Got it. Got it.
Let me -- I want to show you something else. Bear with me. Okay.
I just put in what we'll make as Exhibit 6, which is your -- your national -- your New England Journal of Medicine response letter. It should be coming up right quickly.
(Whereupon, Chan Exhibit 6 was marked for identification.)
THE WITNESS: Yes.
BY MR. MIGLIACCIO:
Q. Let me know if you have that.
A. I do.
Q. Okay. So this study received three formal published critiques in the form of letters to the editor, right?
A. Uh-huh.
Q. And you responded to those critiques, correct?
A. Yes.
Q. Okay. And I think -- is it fair to say you acknowledged some limitations of the study including some special cases where your methodology was less applicable --

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A. Uh-huh.
Q. -- but you went on to defend the study by arguing that, and I quote, "Our study goal was to identify and characterize forms of inaccuracy in the RUC's time estimates and develop a general approach for obtaining better estimates. The crux of that approach is the use of large, longitudinal data sources."
A. Uh-huh.
Q. And, "We welcome debate, reflection, and refinements regarding the most appropriate data sources and estimation techniques."
Did I read that correctly?
A. Yes.
Q. Is it fair to say that you were using estimation techniques in your -- in -- in your paper, in the underlying paper?
A. Estimation techniques.
I'm just going to read this again.
Q. Yeah, I want you to -- please take --
A. Yeah.
Q. Feel free.
A. I believe this reply in the critiques are almost entirely about multi-procedure -- cases where more than one procedure is done at the same time; is

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that right? That's my interpretation of -- upon re-reading the reply.
Q. Is it fair to say that you used estimation techniques?
MR. STOY: Object to the form.
THE WITNESS: I'm not sure what you mean by "estimation techniques."
BY MR. MIGLIACCIO:
Q. So I'm just going to read the last sentence of your reply, which is, "We welcome debate, reflection, and refinements regarding the most appropriate data sources and estimation techniques."
Do you see that?
A. Uh-huh.
Q. What did you mean by that?
A. I think I meant -- so the entire goal of this -- this committee called the RUC, the relative value scale update committee, is to form estimates of certain things that are going to go into the decision-making process of how much to price a procedure for Medicare.
So they have a technique, which is to, you know, use surveys and ask physicians how long they spend on a given procedure. That's their estimation

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technique. And so this paper is about the accuracy of their estimation technique and what's reflected in another data source, in this case, the NSQIP.
So I'm not sure if I would say I use estimation techniques or I'm commenting on how their estimation technique compares with measures in another data source.
Does that make sense?
Q. I -- I think so.
What -- what is the NSQIP?
A. This is the National Surgical Quality Improvement Program data source that measures time spent on various procedures.
Q. How does it do that?
A. That is a good question. I'm not intimately knowledgeable about exactly all of the mechanisms that are put in place. But it records the time that a surgery -- a surgical procedure is started and it records the time that the surgical procedure is ended.
I would assume that this takes some type of report by the surgeon in question to report the starting and the ending time, and then once you have those, you can -- you -- you measure the amount of time a given procedure took. So here an estimation

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is about time.
Q. Uh-huh. Is it fair to say there's a -- there's variation in time that surgical procedures take across different people --
A. Yes.
Q. -- of patient populations?
A. Yes.
Q. And what is the R -- the RUC? What -- what is the -- what is RUC seeking to do? What is the purpose of RUC?
A. The purpose of the RUC is to make recommendations to how Medicare might price services in the Medicare physician fee schedule.
Q. Got it.
So there may be variations across patients for patient populations that are reflected in NSQIP. RUC seeks to price those services regardless of the variations; is that fair?
A. Sometimes, you know, it might change. This is -- you know, it's a good question. Like sometimes, because things vary so much, you might decide to have two different services instead of one service.
Q. Uh-huh.
A. So it's --

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Q. But the same service, the same service, same price, right?
A. But you could -- so how you define services is completely -- it's a -- it's not set in stone.
For example, colonoscopy has multiple services associated with that, right, it's colonoscopy with clipping. Sometimes you could, like, define a service based on the patient that's getting the service.
So when you say one service and it's very different and there's only one price, that's not entirely accurate because medical societies, the AMA, you know, when they figure out how to design CPT codes, they could actually specify different services if those -- if that single service is different enough in different cases.
Q. But there are certain codes, right, so -- so if you have -- and I understand that the service could -- there might be different types of colonoscopies. But let's talk about the one that -- I think you said colonoscopy with clipping, right? That's one code, right?
A. I -- I would have to review the codes. There -- there might be multiple codes.

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Q. Okay. Let's take -- let's hypothetically take one, right, one code. If that code is being priced, the RUC seeks to -- to -- to impose a price on that code regardless of whether there might be variation of the time spent providing the service in that particular code; is that fair?
A. What I'm saying is that the American Medical Association does not necessarily take that as given. The American Medical Association, which houses both the RUC and the CPT committee, can recommend that we have two different CPT codes and not one CPT code.
Q. Sure. But in each CPT code there is one price being paid; is that right?
A. For a given CPT code in a given year and given geography for a given type of provider, Medicare pays one price.
Q. Got it.
Regardless of the variation of the patient population that receives that service or regardless of whether the service might take longer in one individual patient versus another?
A. That I'm not a hundred percent sure. I know that there's a lot more nuance than even I am aware of.

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For example, if Medicare is -- is paying a teaching hospital or the hospital has like sicker patients in a -- some type of disproportionate service pool where the patients are underserved, Medicare can still deviate from its fee schedule and pay a higher price. They can pay different prices, even if...
So what I just told you is a very stylized world where it's just the geography, the type of provider, the year, and the service. But largely that's true for Medicare, but even -- even then, there's a lot -- there's more nuance than I think somebody who is steeped in Medicare would be able to tell you.
Q. When you say "largely that's true," you know, what percentage -- you know, how true would that be, you know, would you say 95 percent true, 99 percent true? Do you have an estimate?
A. I can't really give you a number right now, no.
Q. Does such a number exist somewhere?
A. It should. It should exist somewhere. You can -- go ahead.
Q. Sorry.
A. I think you could do the analysis by

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looking at individual Medicare claims and asking to what extent is the Medicare reimbursement fully determined by the characteristics that I just told you.
Q. Is there a central -- is data kept on deviation from the schedule? Does that data exist?
A. For Medicare? Yes.
Q. Uh-huh. It does?
A. Yes.
Q. Okay. And that data would be the data that we would look at to determine, you know, whether and what percentage there -- there may be a deviation from the schedule on the whole?
A. Right. For -- for Medicare? Yes.
Q. Got it.
So for the Medicare prices, then, that we just talked about, taking aside the deviation that we don't -- haven't characterized, those prices are knowable, right, depending on the geography, the services provider -- you listed a few different items, but those prices are knowable, right?
MR. STOY: Object to the form.
THE WITNESS: Aside from the deviations, yeah. For Medicare, yes.

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BY MR. MIGLIACCIO:
Q. Got it.
Do you use Medicare data in your work? Is that -- is that information that you -- you use a lot in your academic work?
A. I use it to some extent.
Q. What extent do you use it?
A. It's hard for me to place a percentage on it. I would say nontrivial extent, probably not the majority of my work.
Q. What -- okay.
I'm going to show you another paper here. Bear with me.
MR. MIGLIACCIO: I'm going to name this Exhibit 7.
(Whereupon, Chan Exhibit 7 was marked for identification.)
BY MR. MIGLIACCIO:
Q. And it is a paper that you published in -- let's see. I'll tell you in a second.
That was published in -- can you see it now -- Quarterly Journal of Economics?
A. Uh-huh.
Q. Okay. Great.
I'll give you a chance to look at that.

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A. Yep.
Q. Okay.
A. Uh-huh.
Q. Okay. This study, you focused on health insurance prices, right?
A. Study focuses on pricing recommendations from the same company that I just described, the RUC.
Q. Uh-huh.
A. And it looks at Medicare prices. It also looks at private insurance prices.
Q. Got it.
You use the term "average" eight times in this paper.
A. Uh-huh.
Q. Is that right?
A. I would need to check. I don't have any --
Q. Yep.
A. -- reason to dispute it.
Q. Okay.
A. Actually, I think --
Q. More than that.
A. It says 17 times.
Q. Yeah, that's what I got, too. Glad I'm

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wearing my reading glasses. I can -- I can --
A. Yeah.
Q. I wasn't before.
A. I say "median" twice.
I see -- say "standard deviation" probably -- it's tucked with standardized so -- let's see. There it is. I say "standard deviation" five times.
I say "variants" once. "Covariants" once. I say "variation" 32 times.
Q. I see the standardized, too. Let's -- let's look at that.
What did you do to standardize this in -- you said -- and I'm looking at Figure 3. I think.
A. Uh-huh. Figure 3?
Q. Yeah -- or actually, I'll look at where -- where you say on page -- I guess on page 1316.
A. Uh-huh.
Q. The bottom of the first paragraph, "Finally, for interpretation, we standardize" -- and I won't try to say that equation because I'll mess it up -- "by subtracting the sample mean and dividing by the sample standard deviation, and denote this standardized measure."
What -- so tell us what you did with

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respect to standardizing.
A. The standard -- the term "standardize" means to do exactly that, you subtract the mean and you divide by the standard deviation. The mean is the first moment and the standard deviation's the second. It's the square root of the second moment. And the second moment is a measure of variation.
Q. I see.
So what -- what is the -- you were a math major, right, I think I saw that in your resumé.
A. Yes.
Q. I could see how that would come in handy once you move into economics.
What is the benefit of standardizing the dataset that you -- that you standardized here? Why did you do it?
A. The primary benefit is that you can then -- you become -- you make the scale of the variation the same between two different variables. So you're standardizing -- if you divide it by the standard deviation, it means that you're not going to have one data -- one set of observations that -- values that range from, say, zero to, like, 8,000 and another one that ranges from, like, 0.5 to 3.5.
Like it's -- when you standardize

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something, you make the distributions comparable by having standard deviation by definition being zero. If you divide by the standard deviation, the distribution of the standardized variable is going to have a standard deviation of one and a mean of zero. So you don't have to worry about what's called the location of the variable, which is the mean, and the variants of the variable because it's all standardized to zero and 1.
Q. Got it.
What was the dataset here that you were working with?
A. This one -- the thing that I'm standardizing is quite an involved variable, which is -- it's described in equation 4 there -- where it's quite involved.
What I would need to know to do that, to calculate that, is this -- first you would need to know this little A -- okay. So in order to -- to know this you'd have to go to equation 3, which tells you what this little A thing is.
This little A thing is -- okay. And we're actually having to go to equation 2. I think.
Q. Yeah, yeah, yeah. And I have to go back to -- yeah, yeah. Okay.

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A. Okay. So I don't want to waste your time here because it's going to be quite involved and I'm not sure it's related to --
Q. Yeah, yeah, let me -- let me try to -- let me try to reframe my question.
When -- the dataset that you were working with -- I think you say you -- you had three datasets; is that right? I'm -- I'm just trying to see what -- what was the -- what were the datasets that you were working with in this paper?
A. Uh-huh. Umm, I believe that it might be in -- is that in the paper described? There's a Section III.A on page 1310 that talks about the data that I'm using.
Q. Yep. Yep. Three sources of data.
A. Yeah.
Q. RUC's liberations. Yep.
A. Yep. So there -- there's -- roughly speaking, I know each proposal -- this is about the pricing decisions that the RUC makes, or the pricing recommendations.
And so for each CPT code that gets priced, I know who are the people that are on the proposal, so it -- it's a political process in some ways where if there's a CPT code that is done by cardiologists

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that needs to be priced, there will be a proposal that's written by cardiologists and maybe having other subspecialties or specialties on that proposals.
So I'll know who are -- what are the identity of the specialties on that proposal, what are the identities of the specialties on this committee called the RUC. That's one dataset.
The other dataset is using Medicare claims.
And I believe -- is there a third dataset that is kind of using private sector prices. So that's not quite used in the equation that you highlighted. The equation that you highlighted uses the first two datasets.
Q. Got it.
But it sounds like -- I mean, you -- you have created some averages. You've used some standard -- you've standardized certain datasets.
What other -- what other techniques did you use with this data?
A. Yeah, I mean, so there are several, right. There's --
Q. Yeah.
A. If you look at equation 2, it's -- it's

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creating a share. It's -- it's summing up a number of quantities and dividing -- so there's a numerator which is part of the denominator so this is creating a fraction. And when you have the fractions, I'm creating a vector of fractions that's sum for one. That's equation 3.
I'm calculating the Euclidean distance, which is the -- kind of the sum of squares and you take the square root of that and then once you have that, then I'm taking the maximum operator in equation 4 and then I'm taking an average of that.
So an average does play a role in this but it's not the only operation that I'm doing here.
Q. Right. Right.
I mean, would you agree with me that -- that you do use averages to arrive at a measure of central tendency in -- in your -- in your work?
MR. STOY: Object to the form.
THE WITNESS: Averages have a role here. But as I said earlier in the deposition, it really matters that you get the sample right. If you take an average of a different sample and try to apply that to another sample, that would be invalid.
What I'm doing here is I'm describing -- I'm not trying to say that this is a representative

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of some other sample that is not the same. I'm just describing the sample that I have. It's just a descriptive thing. I'm not saying that this should apply for something out of sample. This is just a description of the sample that I'm talking about.
BY MR. MIGLIACCIO:
Q. Is it fair to say that the use of averages to make sense of real world data and formulate useful parameters for policy decisions is a central tool of healthcare economics research?
MR. STOY: Object to the form.
THE WITNESS: Averages are useful but if you don't use them correctly, you could reach very misleading conclusions.
BY MR. MIGLIACCIO:
Q. So in this case, in this study, by definition, taking averages across datasets sets, they don't represent all data points exactly, right? An average doesn't represent every single data point exactly, it's an average; is that correct?
A. By definition when you're calculating average you're losing information, yes.
Q. That -- and that's the whole point of using an average, right?
A. The point of using an average is most

often to describe the dataset that you have -- to describe the data that you have at hand. It becomes dangerous when you use that to extrapolate to another dataset that you don't have or to use -- to extrapolate to another thing that you're interested in that is different. That's kind of the point that I'm trying to make.

Q. So I'm going to show you one more, one more paper here. Let's see. This paper here --

A. Oh. Let me just -- oh.

Q. Yeah, no, I'm -- I'm still -- I'm going to ask you just a few more questions about this one.

A. Oh, okay. This is Exhibit 1 or Exhibit 7?

Q. This is still -- this is the same exhibit we were just looking at, so --

A. I just left it. Okay. So it's Exhibit 7.

Q. Exhibit 7, yes. Yep, yep, yep. Yep. So this paper, is it --

(Whereupon, a brief discussion off the record.)

BY MR. MIGLIACCIO:

Q. Is it fair to say that this paper is concordant with lots of other studies showing a strong relationship between Medicare and commercial prices?

MR. STOY: Object to the form.

MR. KUM: Madam Court Reporter, can you read the question back to me.

(Whereupon, the reporter read the record as follows:

"Question: Is it fair to say that this paper is concordant with lots of other studies showing a strong relationship between Medicare and commercial prices?")

MR. KUM: Thank you.

THE WITNESS: So I think we have to be precise about the relationship here. The figure that talks about this relationship is in -- is Figure 7 on page 1338.

And what it shows there is that it shows various kind of slopes here. Which means that, generally speaking, when you have a procedure that has a higher price in Medicare, you're going to have a procedure that has a higher price in private insurance, okay.

But you can see that this slope differs between different types of procedures. That's kind of the main point of this figure, is that when a procedure is priced by the RUC versus not or when the procedure is priced in a case where the RUC and

the proposing specialty have higher affiliation versus lower affiliation, you can see a big difference in the slope here. Which means that the relationship depends on that.

Second, is that I think for the purpose of this case, we care not about kind of changes on changes or the slope. We care about the levels. We care about if private insurance is, say, 50 percent higher or 20 percent higher or, you know, 10 percent higher than -- than Medicare. So it's the exact magnitude.

So even if we had something that was exactly concordant, meaning if we increased the price in Medicare by 5 percent, the private insurance price would be increased by 5 percent.

The level matters a lot when we're coming up with the price of the medical monitoring program or the spending that would be involved in the medical monitoring program because it could be 50 percent higher or it could be 20 percent higher uniformly and that could be a big difference in how much we decide to -- you know, how much we're saying that the medical monitoring program has to -- is going to cost.

So if you look at this graph on panel A,

for example, the scale on the Y axis goes from zero to negative 4 logs. Whereas the scale on the X axis goes from negative 6 to zero. That's huge in terms of log terms.

Usually, when you talk about -- it's hard to kind of interpret exactly, but when something is 0.5 logs higher that means it's generally 50 percent higher. So if -- if you just look at the scale, the scale tells you the private insurance is much more generous than Medicare. And it could vary by a lot.

BY MR. MIGLIACCIO:

Q. Is it fair to say that in many situations, notably when the RUV (verbatim) update committee, the RUC, changes Medicare prices there is a consistent and strong relationship between Medicare prices and commercial insurer prices?

A. I think it depends.

Q. What does it depend on?

A. In this figure, what I'm showing you is that it depends on the -- whether it comes from the RUC. There are many price changes that don't come from the RUC. And whether the RUC prices comes from, like, a proposal process where the proposers are more affiliated or less affiliated to the RUC. And that's just one dimension in which it depends.

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Q. Would you say it's fair that this paper supports the use of Medicare as a way to predict or estimate commercial prices, which may be --
A. No.
Q. -- imperfect but does offer an important methodology; in other words, if you know Medicare prices, you could use the existing academic literature to estimate where commercial prices might fall?
A. I think it would be -- go ahead.
MR. STOY: Object. Object to the form of the question.
Go ahead.
THE WITNESS: That's -- that's not -- it would not be fair to say that.
BY MR. MIGLIACCIO:
Q. Why not?
A. It, again, depends on the purpose that you're trying to use it for. If the purpose is to estimate the spending that you would have for a medical monitoring program you might be 50 percent off or you might be a hundred percent off.
Q. I'm -- I'm not asking you about estimating anything for a medical monitoring program. I'm asking you -- this is an academic paper, right, this

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wasn't published for a particular purpose. I'm asking if that's a fair reading of your conclusion.
A. Can you restate -- a fair reading -- again?
Q. Yeah.
Is it fair to say in many situations, notably, when the RUC changes prices, there is a consistent and strong relationship between Medicare prices and commercial insurer prices?
A. It's fair to say that when the RUC changes prices, you will see changes in the same direction in private insurance in general. This is talking about changes on changes, not levels of prices. For the medical monitoring program you would need levels of prices, not just changes.
Q. The RUC sets the prices, though, does it not?
A. It recommends prices in some cases.
Q. Okay. In some cases.
Didn't -- we just talked about that in relation to your last paper, didn't we?
A. Correct.
Q. That it recommends prices and -- but for deviation at times, which we haven't quantified, those are the prices that are paid, right?

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A. The RUC recommends prices, then the federal government decides whether to implement the RUC's recommendations.
Q. Okay. How often -- so the RUC -- the federal government decides and then what happens after -- if the federal government decides to implement them, then what -- what happens next?
A. Then it goes into the Medicare Physician Fee Schedule.
Q. Got it. Got it.
Is it fair to say that your findings here in this paper -- and I'm not asking you about the medical monitoring at issue in this case -- but just generally, you know, if the findings here provide another data point to support the known relationship between Medicare and commercial prices?
MR. STOY: Objection. Form and scope.
THE WITNESS: Can you restate the question again?
BY MR. MIGLIACCIO:
Q. Yeah.
Is it fair to say that your findings here in this paper generally provide another data point to support the known relationship between Medicare and commercial prices?

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A. It's fair to say that this study supports a relationship between Medicare and commercial prices.
Q. Have other people recognized that relationship?
A. Yes.
Q. Okay. Who -- who else has recognized that relationship?
A. In the economic literature, I think the paper that most people would cite to you is Clemens and Gottlieb, which I believe I cite in this paper.
Q. Uh-huh. Tell me about that paper. Was that peer-reviewed?
A. Yes.
Q. Was this -- was this paper peer-reviewed?
A. Yes.
Q. Is the Clemens and Gottlieb paper known to be reliable?
A. You know, again, it depends on reliable for what?
Q. For the conclusion that there is a relationship, a known relationship between Medicare and commercial prices?
A. Yes.
Q. Okay. And your paper here, is it reliable

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for that conclusion as well?
A. My paper here is kind of -- adds additional interpretation to that relationship.
Q. And is it reliable for that additional interpretation?
A. I believe so.
Q. Who is Michael J. Dickstein?
A. He is a professor at NYU.
Q. And you were coauthors on this paper?
A. Correct.
Q. Did you receive any comments on it or that you responded to? Was there any further correspondence with respect to it?
A. In the same way that the --
(Technical difficulties.)
(Whereupon a brief discussion off the record.)
THE WITNESS: Okay. I asked, in the same way that the New England Journal paper had correspondence?
BY MR. MIGLIACCIO:
Q. Yeah.
A. No.
Q. Okay.
MR. MIGLIACCIO: Why don't we -- I don't

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know how long we've been going but why don't we take a quick five-minute break and go off the record.
THE VIDEOGRAPHER: Okay. We're off the record at 2:51 p.m. Pacific time.
(Whereupon, a brief recess was taken.)
THE VIDEOGRAPHER: We are back on the record at 3:03 p.m. Pacific time.
BY MR. MIGLIACCIO:
Q. Okay. All right.
Dr. Chan, just a few more questions before I pass it to my colleague. Really about the creation of your report.
Did you personally write the whole report?
A. I'm not sure what you mean by "personally write," but yes, I did. I -- I wrote the -- the entire report is mine, and I wrote the report.
Q. And with respect to the individuals that helped you, did you screen them or vet them in any fashion before you used their work?
A. I have a working relationship with Analysis Group, and I did get to work with the people that I mentioned on the call to a pretty close extent. And I was able to evaluate the quality of their work throughout as I prepared this report.

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Q. Did you ever meet with any of them?
A. And what do you mean by "meet"?
Q. Like in person. I assume the answer would be no, but I'm just curious.
A. Yes, the answer is -- is no. It was all remote, by Zoom, by telephone.
Q. Did you vet the data that -- that was provided to you? How -- you know, how did you determine that the data that was provided to you was accurate?
A. I did take a look at the data. I took a look at the code that was used to produce the -- so the -- basically the analytical process, which is the raw data, the code, and the outputs and whether the -- the outputs were consistent with my clinical expertise and my knowledge of health policy.
So I evaluated the entire analytical process from being aware of how the raw data looked like, being aware of the analyses that were used to process the data, and the outputs.
Q. Did you -- have you been paid yet for -- for your time?
A. I'm not sure if I've been paid for the invoice that I submitted in January -- or, sorry, for December. That would be the only time that it

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would be paid because I have not submitted invoices for January or February.
Q. All right. When you do get paid, do you get paid your rate plus the attribution at the same time?
A. It's not always the same time. I think it's usually separate, if I -- if I remember correctly.
Q. How's -- how is it separate?
A. I believe there are -- there's payment for my time.
Q. Uh-huh.
A. As a deposit or a check. I think in this case, it's a deposit. And there is a separate payment for the attribution.
Q. Got it.
And -- but are those made like contemporaneously, is I guess what I'm asking?
A. Not necessarily. I think usually not.
Q. How -- do you know when you would be paid for the attribution?
A. Not really. It's kind of random. I don't quite understand the -- when the payments get made.
Q. You get them at some point after you get the -- your payments?

A. Potentially. It's not always after. I don't understand the timing.
Q. Got it. Okay.
MR. MIGLIACCIO: Well, look, I thank you, you know, for your time, and I want to pass the question -- questions over to Layne.
THE WITNESS: Thank you very much. Thank you.

EXAMINATION

BY MS. HILTON:
Q. Good afternoon, Doctor. My name is Layne Hilton and I am an attorney for the plaintiffs and I'm going to be asking you about the portions of your report that pertain to Dr. Conti's analysis.
Do you have an understanding of what the term "medical benefit" means?
A. I have an understanding of what it means to me. I'm not sure if it's a technical term, but it -- to me it -- I do have an interpretation of that term.
Q. If I were to use the term "medical benefit" to describe the activities of a commercial health insurance plan that pertain to things like doctors' appointments and tests and other sorts of -- you know, all of the things that you basically

have been discussing with my colleague all day, would that be accurate that all of those activities would fall under something called a medical benefit of a commercial health insurance?
A. So you're referring to benefits of a commercial -- of a -- of a health insurance plan; is that right?
Q. Yes, I am.
A. Okay. That makes sense.
Q. And -- and so would you understand all of those activities that you have been discussing all day to be activities that fall under the medical benefit of a commercial health insurance plan?
A. Correct.
Q. What is your understanding, then, of the pharmacy benefit associated with a commercial health insurance plan?
A. So whereas medical benefit reimburses care -- medical care, including such as office visits or other medical services that are provided, a pharmacy benefit would reimburse the cost of drugs.
Q. Now, I understand from your discussions earlier today that you have provided expert testimony in a variety of cases. I'm going to ask

you, without you having to specify which cases, if in any of your previous expert testimony you provided testimony about the pharmacy benefit.
A. Yes.
Q. And what aspects of the pharmacy benefit have you previously testified about?
A. I'm not sure what I can disclose other than that I have testified on the structure of pharmacy benefits in the healthcare landscape.
Q. And are you -- are you referring to the tiering structure of formularies?
A. That's part of it.
Q. Have you previously testified about the pharmacy benefit as it relates to generic drugs?
A. Some of my previous testimony does bear on generics.
Q. What aspects of the generic drug pharmacy benefit have you previously testified about?
A. I'm not sure if I could specify other than that generic drugs are covered under pharmacy benefits. Sometimes pharmacy benefits will favor one drug or another. Cost considerations and efficacy are some considerations.
Q. Have you ever previously provided testimony about the economic value of certain

generic prescription drugs to consumers?
A. No.
Q. Have you ever previously testified about the economic value of certain generic prescription drugs to third party payors?
A. I haven't testified on that, no.
Q. Have you ever provided any testimony about the costs of generic prescription drugs paid by consumers at the pharmacy point of sale?
A. I have not testified on that.
Q. Have you ever previously testified about the costs of generic prescription drugs paid by third party payors at the pharmacy point of sale?
A. I'm not sure.
Q. Have you ever provided any testimony about the generic drug approval process?
A. Not directly. It may have been touched upon in the context of discussing generic drugs.
Q. Have you ever provided any direct testimony about the food and drug cosmetics act?
A. No.
Q. Have you ever provided any direct testimony about the Drug Supply Chain Security Act?
A. No.
Q. In your academic life, as it were, have

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you ever conducted any research on the food and drug cosmetics act?
A. No.
Q. Have you ever conducted any research on the Drug Supply Chain Security Act?
A. No.
Q. Have you ever worked on any FDA task forces related to the approval and regulation of generic prescription drug products?
A. No.
Q. Have you ever worked as an advisor to the FDA's Office of Generic Drugs?
A. Not in that office, no.
Q. Which office with the FDA have you worked for?
A. I believe that is in -- on my CV. Under Other Professional Positions on page A-2.
Q. Yes, I see it.
It looks like you worked for the Center for Devices and Radiological Health?
A. Yes.
Q. And also, you worked in the -- as the -- in the White House Office of Science and Technology Policy; is that right?
A. In the office of planning and analysis at

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the Center for Drug Evaluation and Research.
Q. Great.
In the context of your work as a staff fellow with the office of planning and analysis for CDER, as I will shorten it to get us through this, what -- what sort of activities did you engage in?
A. In various policy analyses I worked with a group of economists, mostly, who were in this office. I -- some of the issues that we analyzed were ways to surveil for potential drug side effects and potential safety -- kind of prescription drug safety programs to -- to ensure that the drugs were being safely used.
Q. Did any of this work relate to potentially counterfeit or illegitimate drugs?
A. No.
Q. Did any of this work with the FDA relate to potentially adulterated or misbranded drugs?
A. No.
Q. Throughout your report, you use the term "affected valsartan."
In your own words, how do you define "affected valsartan"?
A. I believe that's in paragraph 11 of my report, "valsartan products that were recalled due

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to possible nitrosamine impurity."
Q. So your term "affected valsartan" only relates to the valsartan products which were recalled; is that right?
A. Which were eventually recalled, I believe. I think that any valsartan -- valsartan that had the possibility of a nitrosamine impurity -- again, I'm not a -- I haven't read so much on the -- on the exact sequence of events here, but I believe that valsartan products that had the potential for nitrosamine impurities were eventually recalled.
Q. Are you aware that there were valsartan products manufactured by the defendants in this litigation that had expired by the time of the recall and therefore were not part of the scope of the recall?
A. I'm not aware of that. That wasn't something that I looked into in great detail.
Q. So your report makes no opinion or takes no opinion about products manufactured by the defendants which were expired and never recalled by the FDA; is that right?
MR. STOY: Object to the form. Mischaracterizes testimony.
THE WITNESS: Can you say that again?

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BY MS. HILTON:
Q. Sure. It's a confusing question.
Does -- do you -- do you have any opinion about valsartan products that were manufactured by the defendants but which expired before the FDA's recall?
A. Were these products ever used by patients?
Q. They were.
A. What do you mean by "expired"? So they were -- they -- they were expired in the patients' hands or they were prescribed to patients after they had expired?
Q. So as I understand it, for some period of time between 2012 and let's call it 2016 or 2017, there were many valsartan products that bore unique NDC codes that were dispensed to patients at the point of sale that were manufactured by the defendants in this litigation.
At the time of the FDA recall, many of these products had expired and had already been consumed by the patients and therefore, were not within the scope of the FDA's recall list.
And so my question is -- you know, and perhaps I can ask it a different way.
Did you expand your analysis to include

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those products which were not a part of the FDA's recall list but were nevertheless manufactured by the defendants, you know, from 2012 until 2018?
A. So these include drugs that were actually consumed by consumers before the recall, before it was known that nitrosamine -- before that -- before nitrosamine impurities were known; is that right?
Q. Correct.
A. I believe I do consider those drugs.
Q. And how did you identify the NDC codes associated with those drugs?
A. I believe the NDC codes are linked to the manufacturer of the drugs. So we would look for valsartan -- we have a list of -- in my report I believe I do describe how we identified the NDC codes.
So for -- this is kind of looking at footnote 23.
It says, "For my analyses in this report, I used the list of NDC's identified as recalled on the FDA's website to determine 'affected valsartan' products."
So these are -- this is something I'll have to think about whether the NDC codes -- so the NDC codes are specific for a manufacturer of a -- of

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this -- of this -- a manufacturer and a molecule and -- so these are drugs that were eventually recalled but even -- but these NDC codes would have existed before the recall.
Q. Correct. And -- and this was actually an attachment to Dr. Conti's report. I was -- I guess I was trying to determine if you used the same NDC list that was used by Dr. Conti in her report or if you used a different list. It looks here like instead you used the FDA recall list; is that right?
A. To the best of my understanding right now, yes, but we could check the two lists to -- to -- to figure out whether they're the same or how they differ.
Q. Thank you.
For the purposes of your report related to Dr. Conti, did counsel ask you to make any assumptions in drafting this report?
A. Not to my knowledge.
Q. So counsel did not ask you to assume that the affected valsartan was considered adulterated by the FDA?
MR. STOY: Object to the form. Calls for a legal conclusion.
THE WITNESS: I'm not sure if that

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assumption is required. I know I considered that possibility, that affected valsartan contained nitrosamine impurities and that there is even a possibility of cancer risk due to these impurities.
BY MR. MIGLIACCIO:
Q. So you assume that the affected valsartan contains nitrosamine impurities and that there was a possible cancer risk due to those impurities?
MR. STOY: Objection. Mischaracterizes his testimony.
THE WITNESS: I considered the possibility that affected valsartan contained nitrosamine impurities that could increase the risk of cancer for some patients.
BY MR. MIGLIACCIO:
Q. You didn't assume that the affected valsartan was considered adulterated by the FDA?
MR. STOY: Asked -- asked and answered.
THE WITNESS: Can you restate that question?
BY MS. HILTON:
Q. I'll ask it a little bit more clearly.
Did you assume that the affected valsartan was considered adulterated by the FDA?
MR. STOY: Objection. Asked and answered.

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THE WITNESS: I did consider -- you can see in my report that the FDA -- the actions of the FDA are considered in my report but they're not central to my opinion of the value of valsartan.
BY MS. HILTON:
Q. And looking at your report, you actually never use the term "adulterated"; is that fair to say?
A. I believe I have -- I don't use that term. I say valsartan with impurities. I am not an expert to tell the difference between the term of "impurity" versus "adulterated."
Q. So you're not providing any expert testimony about adulteration generally; is that fair to say?
A. Adulteration versus impurity, I don't know any difference between the words.
Q. For the purposes of your report, did you assume that the affected valsartan was manufactured in compliance with all regulations, including Current Good Manufacturing Practices?
A. Can you ask that question again?
Q. Sure.
For the purposes of your report, did you assume that the affected valsartan was manufactured

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in compliance with all regulations, including Current Good Manufacturing Practices?
A. I don't think so. And I don't think that assumption is necessary for my opinions.
Q. Why don't you think that assumption was necessary for your analysis of Dr. Conti's report?
A. Because for the claim of worth -- the worth of valsartan, I am considering what does that valsartan do. I -- I'm considering the benefits of valsartan in terms of blood pressure control and in terms of treating heart failure. And I'm considering the possibility of a cancer risk.
Whether the valsartan was manufactured in a certain way and whether it met certain regulations, whether supply was allowed by the FDA or not, that is not something that I considered relevant for the assessment of worth.
Q. You are aware, however, that Dr. Conti's value and opinion about the value of the affected valsartan hinges upon the fact that the valsartan was considered adulterated because it was manufactured in a way that did not comply with Current Good Manufacturing Practices, correct?
A. I'm aware of her opinion on that, yes.
Q. So no aspect of your particular report

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directly addresses that opinion; is that fair to say?
MR. STOY: Object to the form.
THE WITNESS: I think it's fair to say that I don't agree with that framework of assessing value.
BY MS. HILTON:
Q. Before we get into your proposed framework of value, let's make sure that I understand the sort of limitations of your opinion as it relates to the economic value of the prescription drugs.
You're not offering any opinions about the data sources used by Dr. Conti in her calculation of damages, correct?
A. I'm not commenting on the data sources because my primary opinion is at odds with her framework.
Q. You're likewise not offering any opinions on pharmacy benefit structures and the cost paid by consumers or TPPs at the point of sale for the affected valsartan that was dispensed at the pharmacy, correct?
A. Can you restate that?
Q. Sure.
Are you offering -- I'll put it more

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affirmatively.
Are you offering any opinions about the pharmacy benefit structures and the cost paid by consumers or TPPs at the point of sale for affected valsartan?
A. That information is not central to my opinion. Although the idea of costs and revenues and profits to various parties is something within economic -- my economic expertise.
Q. But you're not offering any of those opinions in this report for this purpose today?
A. Correct.
Q. Right?
A. Correct.
Q. In your -- are you offering any opinions on a drug manufacturer's obligation to comply with Current Good Manufacturing Practices?
A. No.
Q. Are you offering any opinions on contracts which may impact the amount paid for affected by -- for affected valsartan by any TPP?
A. No.
Q. I would like to talk to you about getting into the context of a report which I believe was previously marked as Exhibit 2.

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A. Uh-huh.
Q. I'd like to talk to you about paragraph 133 of your report, if you'd like to flip there.
A. Okay.
Q. And in this paragraph you are discussing the -- let's call it supply and demand framework of Dr. Conti's opinion.
A. Uh-huh.
Q. And you write, starting in the middle of that paragraph, "The implementation of her approach relies on faulty reasoning. Dr. Conti asserts that 'according to economic theory, for a consumer product to have economic value, demand for the product must exist and supply must be allowed to meet demand.' However, the demand curve alone speaks to a product's economic value and is based on each patient's and TPP's willingness to pay for a drug."
Do you see that?
A. Yes.
Q. And then to support that economic theory you cite to a -- let's call it a -- a chapter or a textbook or some sort of treatise; is that right?
A. Yes.

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MS. HILTON: I am going to mark for the record --and which -- what exhibit are we on?
THE WITNESS: 7.
MS. HILTON: Yeah. Exhibit 8, I think.
THE WITNESS: Okay.
MS. HILTON: I am going to mark as Exhibit 8 this citation footnote 252.
(Whereupon, Chan Exhibit 8 was marked for identification.)
BY MS. HILTON:
Q. Okay. Let me know when you have Exhibit 8 up.
A. Yep.
Q. Can you tell me what particular section of this chapter you were using to support your opinion that the demand curve alone speaks to a pharmaceutical product's economic value and is based on a patient/TPP's willingness to pay for a drug?
A. Okay. So in these pages, there is no supply curve. What we call consumer surplus is very closely related to the economic value. Consumer surplus is the demand curve that lies above the price.
Q. Do you -- does this particular chapter relate to pharmaceutical drug products?

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A. This is an economic -- an economics textbook which is quite general when we talk about demand curves and supply curves. This particular chapter uses a very -- it uses any -- it uses just a random example of rock concert tickets but the focus is not about rock concert tickets.
Q. Does this chapter in the discussion of the consumer surplus presuppose that all of the items that are subject to this consumer surplus analysis are items that can legally be on the market?
A. There's no presupposition of that.
Q. So this would relate to anything, even products that are illegal to sell on the market?
A. It could have been illegal rock concert tickets or it could be --
Q. I'm sorry.
A. -- or -- go ahead.
Q. No, continue.
A. They could have been illegal tickets.
Q. Where does it say that it -- that the tickets could have been illegal?
A. It doesn't say it in the text, but if you were to ask any economist -- well, I guess maybe if you were to many economists -- Dr. Conti's an economist -- it does not presuppose the legality.

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That's irrelevant. It's only relevant in so far as it affects consumer surplus or the demand curve. It doesn't depend on a supply curve.
Q. If we look at the second page of this particular PDF, it says, "To calculate the aggregate consumer surplus in a market," does that not indicate that there must be the product on the market?
A. You can also talk about consumer surplus for a good that doesn't yet exist. It does not presuppose that there must be a market for it. It happens to say in the market, but that's not a requirement.
Q. Where in this particular chapter does it indicate that it is not a requirement of the product at issue for consumer surplus must not be in the market?
A. In this chapter there is no mention of a supply curve.
Q. So that is the basis for your statement --
A. It doesn't require a supply curve. Usually we do have a market and that's why this is kind of the usual setting but when you're talking about willingness to pay and when you're talking about utility you don't need a market.

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Q. Would you agree that the market for concert tickets is very different than the highly regulated market of prescription drugs?
A. Yes, but this chapter is not about concert tickets. This chapter is a general economic textbook on economics, on microeconomics, and this chapter is about consumer surplus which applies to both concert tickets and prescription drugs.
Q. If we look at the next sentence of paragraph 133 you go on to write -- I think this is what you were alluding to before -- that sometimes there could be a value for a product that is not yet on the market.
You write, "Consider a pill that cures cancer, there is no supply for such a pill as one has not been invented yet, but it is certainly possible to consider the patient and TPP's willingness to pay for such a pill and the inherent economic value such an innovation would provide."
Do you see that?
A. Yes.
Q. In this particular example of the hypothetical pill that cures cancer, are you assuming that the pill at issue has been manufactured in compliance with good manufacturing

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practices?
A. No.
Q. So it is your opinion that consumers and TPPs would be willing to pay for a pill that has not been manufactured in compliance with good manufacturing practices and could not assure that it's safe?
A. I think it's certainly possible.
Q. You don't have any evidence to associate that, correct?
A. I think it's -- I would say it's common sense. You are pay -- you are willing to pay for the benefits of a good. If there is some uncertainty about the benefits of the good, that's why things like, you know, good manufacturing processes, that's why those might be valuable, but if -- in this hypothetical world where we already knew that this pill would cure cancer, we wouldn't have to know whether it was manufactured under good manufacturing practices.
Q. Do you believe that generic drug products that are manufactured in such a way that the product contains glass are valuable?
A. That's a hypothetical question. I think it would depend on the circumstance.

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Q. Are you -- have you ever heard of a generic drug manufacturer named Ranbaxy?
A. Can you restate that question?
Q. Have you ever heard of a generic drug manufacturer named Ranbaxy?
A. I might have. I don't recall right now.
Q. If I were to tell you that Ranbaxy manufactured generic products that contained glass --
MR. STOY: Are you --
(Whereupon, a brief discussion off the record.)
BY MS. HILTON:
Q. If I were to tell you that Ranbaxy manufactured generic products that contained glass and that this -- that these products had to be recalled from the market, would it be your position that these glass-contaminated generic products had value?
A. I don't know enough about this situation to say anything. It's possible that they could still have value, but I don't know enough.
Q. What would you need to know in order to assess whether the drug had value or didn't have value?

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A. I would need to know the medical benefits of taking that drug and the medical harms of taking that drug.
Q. Do you agree with Dr. Conti's conclusion that there exists substantial asymmetry of information about the safety and quality of prescription drugs between the manufacturers of those drugs and the patients who purchase and consume those drugs?
MR. STOY: I'll object to the extent it's beyond the scope of Dr. Chan's analysis.
But you can answer.
THE WITNESS: I don't have a particular opinion on that. I think it's possible. But I think it might depend.
BY MS. HILTON:
Q. What would it depend on?
A. Depends on what the product is. It depends on -- so you -- can -- can you just restate the question? It's asymmetric information between the manufacturers of a drug and -- and who else?
Q. And the patients who purchase and consume those drugs.
MR. STOY: Same objection.
THE WITNESS: It really depend -- I mean,

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there are different types of asymmetric information, right, the patient may have more information about their medical condition than the manufacturer. The manufacturer might have more information about how they manufactured the drug. So the information is not symmetric in different ways.
BY MS. HILTON:
Q. Is that a topic of upon which you'll opine in your report?
A. I don't believe that's a central -- that's a central element required for my opinions in the report. I think ultimately, at the end of the day, the value of a drug is the medical benefit weighed against any harms of the drug.
Q. You describe that -- in the body of your report that in order, as you see it, to calculate the economic value of a product to a particular plaintiff or patient, you would need to know something you describe as the ex-ante value as well as the ex-post value; is that right?
A. In my report, I describe ex-ante value and ex-post value. I just -- I describe that because there are different concepts. There are different concepts of value. It depends on when you're asking about value.

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And this is particularly important when there's uncertainty about what actually is in the drug. Even before we knew that there might be impurities in the valsartan drug, there is still an ex-ante value that could account for the possibility of this impurity. And then after we find out about the possibility of impurity in some of the lots, the value of the drug could be updated in ex-post way.

Q. You -- you testified that there was the -- that it was possible somebody might know about the impurity at the time that they purchased the drug and that would be a part of its ex-ante value?

A. They might know about a possibility of impurity.

Q. What evidence did you review in this case that demonstrated that any one particular patient had any inkling that their valsartan might contain carcinogens?

A. So as one consideration -- one piece of evidence that I -- I mention in the report is that at one point we did know about impurities in valsartan and the FDA recommended patients to continue taking their valsartan. That's one specific -- that's one specific instance about -- about impurities specifically related to

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nitrosamines.

But my earlier statement was about the general possibility that we may discover something about a drug that we didn't know. When you purchase something, there's not a hundred percent certainty about what that thing is in general. And you may discover something that nobody else -- nobody knew about this thing that you purchased and it could include the possibility of impurities in general.

Q. I want to talk a little about your first statement that the FDA made a statement that people should continue to take their valsartan drugs.

You're aware that that statement was made in August 2018, correct?

A. Correct.

Q. So at that point, all of the -- or most of the manufacturers and the defendants in this case had already recalled all of their product off the market at the time that the FDA made this statement, right?

MR. STOY: Object to the form.

THE WITNESS: I don't know the timeline. Can you -- can you say that again?

BY MS. HILTON:

Q. Yeah.

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As of August 2018, at the time that the FDA made the statement you just referred to about the possibility of nitrosamine contamination, many of the defendants had started recalling all of their products off the market; isn't that right?

A. I don't know all the details but if what you just said is true, then some of them did not recall just yet.

Q. But regardless, what the FDA said about the drugs in August of 2018 would have no bearing whatsoever on the ex-ante value of a drug purchased from 2012 until June of 2018, right?

A. That statement would have bearing for people who purchased the drug after the statement.

Q. So would not relate to any of the purchases prior to August of 2018?

A. I think it still relates to whether people would purchase before that time in the sense that that statement is talking about potential value. It's talking about the medical benefits of taking that drug and that would be in the consideration of people who purchased it before.

What I was saying in the second part of my response about the possibility of impurities is that there's always the possibility that something --

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there might be something about that drug that you don't know just yet and that's what I'm calling the ex-ante value.

Q. How does your opinion regarding the ex-ante value of the affected valsartan change in light of the fact that there was valsartan on the market that did not contain nitrosamines?

A. I did consider that.

Q. How did you consider that?

A. So when you're talking about a demand curve, the demand curve incorporates other products that are already in the market.

Q. So is the ex-ante value of a valsartan that did not contain nitrosamine manufactured by a manufacturer that is not a defendant in this case different than the ex-ante value of the affected valsartan?

A. Can you say that again?

Q. Is the ex-ante value of the uncontaminated valsartan manufactured by manufacturers who are not defendants in this case different than the ex-ante value of the affected valsartan at issue in this litigation?

A. And by ex-ante you mean before we knew which manufacturers were associated with affected

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valsartan; is that right?
Q. Correct.
A. I can't say whether they're exactly the same. They could still differ. I don't know the other considerations that might differentiate different manufacturers before it was known which ones were linked to affected valsartan.
Q. In your discussion of the ex-ante value of affected valsartan, you delineated a list of factors that you would look at to determine the value; is that right?
A. Can you point me to the paragraph that you're talking about?
Q. Sure.
134.
A. Uh-huh.
Q. From an economics perspective, how would you go about incorporating these values and these factors in a calculation to determine a prescription drug's ex-ante value?
A. That is not a core -- that's not a core analysis that I did in this report, although I talk about it. The core opinion of this report is whether we can say that affected valsartan is worthless.

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Q. So you have no opinion whatsoever on how to actually go about calculating the ex-ante value of the affected valsartan; is that right?
A. I have some ideas --
MR. STOY: Objection to form.
THE WITNESS: -- but I don't know if they're kind of -- if they're thought through at the proper level that I would be willing to offer them at this deposition.
BY MS. HILTON:
Q. Have you ever conducted a mathematical calculation of a generic prescription drug product's ex-ante value before?
A. I personally have not but I think that there are several ways in which you could address this.
Q. What are those ways?
A. So without having thought in great detail for this deposition, there are ways to value what consumers -- value consumers' utility in terms of different health outcomes. It would -- you can incorporate the value of getting cancer with the value of controlling hypertension. The value of treating heart failure. There are methods to value those things and if -- that's one way to kind of --

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to perhaps to get at these ex-ante values incorporating any uncertainty.
There are possibly other ways to do this that I haven't thought to to the level of detail that I think it would require for this deposition.
Q. Have you ever read any literature about conducting the mathematical calculation for the ex-ante value of a generic prescription drug?
A. I'm aware of literature that -- that uses the approach that I just described to you. And that approach could be applied to the value of a generic prescription drugs.
Q. Is that literature cited in your report?
A. That's -- it's possibly cited in my report. I can't recall. This is not a -- as I said, my report primarily addresses the claim of whether valsartan is worthless, not how one would conduct an economic evaluation of the worth.
Q. Well, you, yourself, have never actually endeavored to conduct such a calculation or evaluation of a generic prescription drug's ex-ante value, correct?
A. Specifically --
MR. STOY: Asked and answered.
THE WITNESS: Go ahead, Frank.

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MR. STOY: I just objected to asked and answered.
You can go ahead.
THE WITNESS: That's a very specific question that you asked, whether I endeavored to calculate the ex-ante value before an information revelation of a generic prescription drug.
It's hard for me to kind of answer whether I have done cost-effectiveness analyses for analyses of patient utility that could bear on that exact specific question, but I have done economic analyses that value different patient health outcomes and weighed them against each other.
BY MS. HILTON:
Q. So the answer is no, you haven't conducted a mathematical calculation to determine the ex-ante value of a prescription generic drug; is that right?
A. It's possible that I have. I just can't remember.
Q. After determining the ex-ante value of a prescription drug, you write that in order to figure out the -- I guess the injury to a particular plaintiff you have to then ascertain the ex-post value of that product.
What is your definition of ex-post value?

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A. What I refer to here as ex-post value is the value that you have after the information revelation.

But I think it's important to note that there are many different steps of information revelation that could be possible.

There is information revelation that you consumed a drug that could contain nitrosamines. And there's further revelation of you may know whether or not you had a lot that had nitrosamines in it. And then ultimately you would need to know whether you suffered cancer as a result of nitrosamines. That could be an event later down the road. There are many different kind of points in the timeline at which you might have different values.

Q. So is it fair to say there's no real concrete way to actually calculate a -- the effect of valsartan's ex-post value?

A. No, it's not fair to say that.

Q. Why not?

A. There is a framework that you could undertake -- and this is not something that I -- again, the key point of my report is that I'm rejecting the idea that anybody who consumed

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affected valsartan had a value of zero. That is the key point that I'm saying.

But if you needed to calculate exactly what somebody's ex-post value would be, as I mentioned, there are methods to use health outcomes and methods to incorporate uncertainty to arrive at a willingness to pay.

Q. Have you ever conducted a mathematical calculation of a generic drug's ex-post value?

A. I think my answer would be similar to your question about whether I've conducted a mathematical analysis to calculate the ex-ante value of a drug. It's possible that I have. I can't really comment at this point. The methods that you would use to do such a thing I have done.

Q. If we look at the second-to-last sentence in paragraph 137, you were talking about risk aversion in this paragraph, and you write, "Second, any reduction in economic value depends on a patient's level of risk aversion, which has been shown to vary across individuals."

Do you see that?

A. Uh-huh. Yes.

Q. When discussing risk aversion, isn't it necessary that a person who is averting risk

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actually have knowledge of that risk?

A. No.

Q. Why not?

A. A risk aversion does not require knowledge of risk. It tells you what -- what is the expected utility of somebody given uncertainty in the future and this person could have many different realizations of whether they get something that's an -- like an -- what would be called a negative shock to their utility versus a positive shock to their utility.

All they need to know in order to calculate risk aversion is how that person's utility varies across different states of the world.

Q. So your testimony is that risk aversion and the idea of risk does not require a person to actually have knowledge of the risk; is that right?

A. To measure risk aversion you don't need -- you don't -- you don't need to know the person's knowledge. It does not require a person's knowledge of the risk to measure risk aversion.

In order to calculate somebody expected value -- expected willingness to pay at a given point in time you would need to know what are the possible states of the world in the future and you

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would need to know the risk aversion but to know their risk aversion you don't need patient knowledge of various events in the future.

Q. But you do agree that the additional risk that nitrosamines in the affected valsartan could in some instances reduce the economic value of the drug, right?

A. In some instances, yes.

MS. HILTON: Can we go off the record. I may be close to finish and I just want to check in with my colleagues.

THE VIDEOGRAPHER: Okay. We're off the record at 4:03 p.m. Pacific time.

(Whereupon, a brief recess was taken.)

THE VIDEOGRAPHER: We are back on the record. The time is 4:09 p.m. Pacific time.

BY MS. HILTON:

Q. Dr. Chan, have you ever prescribed valsartan to a patient?

A. Yes.

Q. How did you personally become aware of the recall of the affected valsartan products?

A. I became aware of the recall through this case.

Q. So prior to this case, you had no

knowledge that the FDA had initiated an unprecedented classwide recall of the affected valsartan?

MR. STOY: Object to the form.

THE WITNESS: As a hospitalist, I don't decide which valsartan, which -- specifically which NDC gets delivered to a patient, gets dispensed to a patient. I write valsartan, the dose, the frequency, and I don't concern myself with whether it's branded or generic and if it's generic, which type of valsartan it is. So there's no reason for me to pay attention to that.

BY MS. HILTON:

Q. And do you not concern yourself with these things because the generic is supposed to be the same as the branded drug?

MR. STOY: Object to the form.

THE WITNESS: That's not the reason that I don't pay attention to these things. The reason that I don't pay attention to these as a hospitalist, personally as a clinician, is that I don't determine which of these drugs, which NDC code is going to be dispensed to a patient for whom I prescribe valsartan.

BY MS. HILTON:

Q. Just generally, though, in your practice as a physician do you have an expectation that the generic products are the same as the branded reference listed drugs?

MR. STOY: Objection. Beyond the scope of his report.

You can answer.

THE WITNESS: This is not a -- this is not -- this is not within the scope of my report. Would you like me to comment on -- I'm not sure.

BY MS. HILTON:

Q. Yeah, I'm just asking you, as a physician, you have that expectation that the generic drugs are the same as the reference listed brand drugs?

MR. STOY: Object to the form.

Go ahead.

THE WITNESS: I think my main expectation is that they should contain the same active ingredient. I know that there is a process by which we might identify impurities in drugs and recall drugs. And that there is no guarantee that a generic drug will be exactly the same as a branded drug.

BY MS. HILTON:

Q. And at what point in your education did you learn about the impurities that may be present in generic drugs?

A. I'm not sure if I remember the time in my education. But I think it's in some ways common sense. You know that generic drugs are made by different manufacturers. You know that they're not exactly the same. The requirement of generic drugs is that they have the same active ingredient. It's not required that they're exactly the same.

And so it follows naturally that there might be things that differ between generic drugs and branded drugs and that we don't know all of these, including the generic manufacturers at the time, don't know all of these things at this point and some of these things could be revealed later on.

Q. Would it surprise you to know that one of the generic manufacturers in this case had knowledge that their valsartan contained nitrosamines a year before they were actually recalled from the market?

MR. STOY: Object to the form. Beyond the scope. Mischaracterizes.

THE WITNESS: I have no knowledge of that.

MR. STOY: Mischaracterizes the evidence.

Go ahead.

THE WITNESS: I have no knowledge of that. I'm not sure if I can comment on that.

BY MS. HILTON:

Q. Okay. Have you ever monitored any patients for cancer?

A. No, not -- let me just -- let me clarify.

I have in the past ordered screening tests for cancer. My current clinical responsibilities does not primarily focus on screening for cancer as a hospitalist.

Q. What screening tests did you order for cancer?

A. In primary care you could order a number of screening tests such as Pap smears or colonoscopies.

Q. Aside from the opinions that are contained within your report, do you intend to offer any other opinions in this litigation?

A. I don't have any plans to do so right now.

MS. HILTON: Thank you, Doctor. I have no further questions.

MR. STOY: Thank you.

Let's go off the record.

THE VIDEOGRAPHER: Off the record for the

day or does anyone have anything else?
MR. STOY: We may have some follow-up questions. I want to take ten minutes.
THE VIDEOGRAPHER: No problem.
We're off the record at 4:15 p.m.
(Whereupon, a brief recess was taken.)
THE VIDEOGRAPHER: We are back on the record. The time is 4:26 p.m. Pacific team.
EXAMINATION
BY MR. STOY:
Q. All right. Dr. Chan, good afternoon again. Welcome back. I know it's been a long day so I'm going to be brief but I do have a few follow-up questions to ask you, okay?
A. Okay.
Q. My first question is, as a matter of economics, can you explain the interplay between price and value?
MS. HILTON: Objection to form.
BY MR. STOY:
Q. Go ahead.
A. Sure.
Value relates to the utility that somebody would get from a product and together this forms the demand curve. Price is something when you have a

market and you have supply and where demand meets supply that's where you have price. So you can have value even if there's no market and even if there's no supply.
Q. Are price and value considered interchangeable terms in economics?
A. No.
Q. Is economic value the same thing as equilibrium price?
A. No.
Q. In paragraph 44 of Dr. Conti's report, and I believe it's maybe Exhibit 3, you can pull it up if you want to, but I'm going to read a statement.
She says, and I quote, According to economic theory, for a consumer product to have economic value, demand for the product must exist and supply must be allowed to meet demand.
Do you agree with that statement by Dr. Conti regarding economic theory?
A. No, I don't agree with that. That is not consistent with what I have described as economic theory and the relationship between price and value.
Q. Can a product have economic value even if there is no equilibrium price in the market?
A. Yes.

Q. Is willingness to pay the only thing to consider in determining economic value?
A. Yes. Willingness to pay and economic value are synonymous.
Q. Dr. Chan, you were shown an article that you had previously written in the New England Journal of Medicine. I believe it was Exhibit 5.
Do you remember that?
A. Yes.
Q. And then you were also shown some comments that were received that were sent to the author. I believe that was Exhibit 6.
Do you remember that?
A. Yes.
Q. Is it uncommon for peer-reviewed publications for the authors to be sent comments by people?
A. I don't know how common it is. But in this case, this was a comment that was a bit ancillary to the main analysis and we acknowledged the comment. And the article itself, I think the main points that we made in the article itself are still valid. The -- it's also -- it also bears mentioning that the comment didn't really make a point about averages versus other types of moments

of a statistical distribution.
Q. Did the New England Journal of Medicine retract your article after those comments were submitted?
A. No.
Q. Was the article ever retracted?
A. No.
Q. Now, I want you to go back to your report, Dr. Chan. And specifically, I want you to look at paragraph 117.
Are you there?
A. Okay. Yep.
Q. Do you recall earlier you were asked some questions with regard to the use of averages?
A. Yes.
Q. Why is Dr. Song's use of averages in his report inappropriate, in your opinion?
MS. HILTON: Objection to form.
THE WITNESS: And I want to clarify that averages are not in and of themselves a bad thing. It depends on how you're using the averages and as I said during the deposition, which sample you're getting the average from and what purpose you're using the average for.
The problem with Dr. Song's use of an

average from some publication that looks at another population, probably a general population, comparing private insurance prices and Medicare prices, is that that average might not be applicable to the class at hand, which by definition, would have had to be patients who took valsartan. And it's possible that that average could be wildly off.

MR. STOY: Okay. Thank you, Dr. Chan. I have no further questions.

MS. HILTON: Can we go off the record for a moment. I just want to confer.

THE VIDEOGRAPHER: Okay. We're off the record at 4:32 p.m.

(Whereupon, a brief recess was taken.)

THE VIDEOGRAPHER: We are back on the record at 4:35 p.m.

EXAMINATION

BY MS. HILTON:

Q. Doctor, Mr. Stoy asked you questions about equilibrium price.

Do you remember that?

A. Yes.

Q. What's your definition of equilibrium price?

A. Equilibrium price is where supply and

demand meet in terms of price.

Q. And it's your testimony that a product can have economic value even if there is no equilibrium price in the market?

A. Yes.

MS. HILTON: I have no further questions.

EXAMINATION

BY MR. MIGLIACCIO:

Q. Doctor, I just have I think one. Maybe -- I thought it was one. We'll see.

You -- Mr. Stoy asked you questions about averages in paragraph 117. And you testified that -- that the average might not be applicable to the class at hand and that it's possible that that average could be wildly off, correct?

A. Correct.

Q. That was your testimony.

I just want to confirm you have not, in fact, done any calculations to determine if the average is not applicable to the class at hand or that the average is, in fact, wildly off?

A. I think I said during the deposition that I have evidence that it's likely that members of the class will be different than the average population and that there is scope for getting the average

wrong if you just look at variation in prices, which we have done in the report.

Q. You have not, in fact, done any calculations, though, to determine if the averages are wildly off or not applicable?

A. The other thing I think I've said in the deposition is that I think it would be quite difficult to actually calculate it so I don't think anybody's done any calculations to show me something about what that price would be other than what the overall average is.

Q. Including you, you have not done?

A. Include me or --

Q. Okay.

A. -- anybody else among the plaintiffs' side.

Q. Got it.

MR. MIGLIACCIO: I have no further questions. Thank you, Doctor.

MR. STOY: Nothing further from us.

THE VIDEOGRAPHER: Okay. This marks the end of today's testimony of Dr. David Chan.

We are off the record at 4:37 p.m. Pacific time.

(Whereupon, the deposition was concluded

at 4:37 p.m.)

INSTRUCTIONS TO WITNESS

Please read your deposition over carefully and make any necessary corrections. You should state the reason in the appropriate space on the errata sheet for any corrections that are made.

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ACKNOWLEDGMENT OF DEPONENT

I,_____, do hereby certify that I have read the foregoing pages, and that the same is a correct transcription of the answers given by me to the questions therein propounded, except for the corrections or changes in form or substance, if any, noted in the attached Errata Sheet.

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DAVID C. CHAN, JR., M.D. DATE

STATE OF CALIFORNIA)
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I, ELAINA BULDA-JONES, a Certified Shorthand Reporter of the State of California, duly authorized to administer oaths pursuant to Section 2025 of the California Code of Civil Procedure, do hereby certify that

DAVID C. CHAN, JR., M.D.,

the witness in the foregoing deposition, was by me duly sworn to testify the truth, the whole truth and nothing but the truth in the within-entitled cause; that said testimony of said witness was reported by me, a disinterested person, and was thereafter transcribed under my direction into typewriting and is a true and correct transcription of said proceedings.

I further certify that I am not of counsel or attorney for either or any of the parties in the foregoing deposition and caption named, nor in any way interested in the outcome of the cause named in said deposition dated the 7th day of March, 2022.

ELAINA BULDA-JONES, CSR 11720

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